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THYROIDECTOMY IN THE TREATMENT OF ADVANCED CONGESTIVE HEART FAILURE AND ANGINA PECTORIS*

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IN spite of the striking advances during the past two or three decades in our ability to diagnose correctly diseases of the heart, progress in treatment has been comparatively slow. Because of a greater understanding of the principles and mechanism of heart failure, the older methods of therapy are now more intelligently employed than formerly. It is possible to predict more accurately when a particular method of treatment will produce improvement and when it will not. The limitations of the use of digitalis are more generally appreciated, and the diuretics have recently been added to the effective procedures in combating peripheral edema. Peculiar disturbances in the rhythm of the heart have been controlled more satisfactorily since the introduction of the use of quinidine and epinephine and it must be realized that occasionally these drugs have even preserved life under circumstances that formerly would have proved fatal. Notwithstanding all this, the great number of patients with heart failure of the congestive type eventually become refractory to all the ordinary therapeutic procedures. The same may also be said of the anginal type of heart failure although relief from pain has been obtained by some of the surgical measures directed at the sympathetic nervous system, such as cervical sympathectomy and alcoholic injection or extirpation of the dorsal sympathetic ganglia.

There is practically only one type of heart disease in which treatment profoundly improves the circulation and in which the improvement is permanent. This occurs in heart failure associated with hyperthyroidism. It is not intended to minimize the great value of digitalis and other remedies that help so many cardiac cripples. For the most part it is necessary to continue such medication but eventually the condition grows worse in spite of all therapy. When, however, the thyroid gland is the cause of congestive heart failure or angina pectoris, a subtotal thyroidectomy relieves the heart of a permanent load and is especially effective if the basal metabolism had previously been elevated. Attention has frequently been called to the remarkable results that have been obtained following subtotal thyroidectomy in patients with hyperthyroidism and various forms of heart disease[1, 2, 3, 4]. The lasting effect of such beneficial results has recently been reported by Rosenblum and Levine[5]. It now seems clear that those disturbances which are entirely due to the hyperthyroidism may be cured permanently by surgical therapy. When hyperthyroidism and some other form of heart disease coexist in the same individual, that part of the disability that was produced by the hyperactive gland may be eliminated by the subtotal thyroidectomy. This often results in a perfectly well compensated circulation despite the presence of some other organic lesion of the heart. A patient previously bedridden with hypertensive heart disease or mitral stenosis and hyperthyroidism may thereby be restored to full activities following the removal of a toxic thyroid gland. Here the extra load on the damaged heart is permanently removed.

It has been stated above that very dramatic results have been obtained when the metabolic rate which had been elevated falls following surgery. It has also been discovered quite recently[6] that hyperthyroid heart disease can exist with a normal metabolism and that even under such circumstances subtotal thyroidectomy can effect marked improvement of this circulation. There is other evidence to make one suspect that not all the effects of the thyroid gland on the heart can be measured in terms of basal metabolism. F. N. Wilson* observed cases of transient auricular fibrillation occurring in patients with a normal metabolism and no enlargement of the thyroid gland, who a short while later showed the more customary elevations in the basal metabolic rate and a palpable thyroid. From this one might infer that the thyroid may produce changes or injury to the heart that are not reflected in alterations in the metabolism. Thoughts along this same line are seen in the two papers by Coller[7, 8], whose investigations revealed several cases with cardiac abnormalities of rhythm and rate occurring in patients with goiter in whom the basal metabolic rate was normal. Moreover, in such cases subtotal thyroid-

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*Personal communication.

ectomy did away with the cardiac abnormality without affecting the basal metabolic rate.

The manner in which thyroidectomy benefits an embarrassed circulation is readily visualized. If a heart already disabled by a valve-defect, arterial hypertension, or sclerosis of the coronary arteries, not only has the normal amount of work to do but has to meet the demands of an elevated metabolic rate of 50 per cent, it cannot be put to rest. Even when kept in bed, such a patient may be compared to one who is walking all day long. The heart carries the added burden twenty-four hours a day. If the metabolism is brought to normal, the heart is then allowed to rest and thus has an opportunity to regain compensation. In other words, the work of the heart is diminished. The beneficial effects from subtotal thyroidectomy possibly result in the above fashion in most cases. But other toxic or reflex influences may be ameliorated which cannot be measured by metabolism readings.

The main purpose of this discussion is to investigate the possible application of the above principles in patients who have advanced heart failure but normal glands. Can the work of the heart be diminished by thyroidectomy in such patients and can their condition be improved? Finally, are there beneficial effects that might follow thyroidectomy apart from those resulting from lowering of the metabolism? With these points in mind removal of the thyroid gland was carried out in a series of patients with advanced heart disease. In a few instances it was not certain whether or not the patient had hyperthyroidism, but it was felt that an operation was indicated. The case reports must necessarily be complete and visualize each case, for we must in many of these cases measure and criticize our findings on clinical data alone. Even if thyroidectomy did not alter in any way the rate of blood-flow, the basal metabolic rate, the vital capacity or other functions for which a mechanical measuring-stick is now available, but did relieve the pain, then the operation would still be desirable. Perhaps in the future a new caliper will be available; for the moment we must use our clinical acumen.

CASE 1. (Med. No. 37679.) A housewife, aged 61, entered the Peter Bent Brigham Hospital on May 17, 1927, complaining of marked shortness of breath.

Family history: her father died at 72. Her mother died at 50 of "shock". One sister died at 48 of "shock".

Past history: some sort of "rheumatism" in 1917.

Present illness: shortness of breath began in 1923 and she had been more or less of a chronic cardiac cripple ever since. She had been up and about until two years before admission when her condition became worse. She had been at another hospital for five weeks and had improved for a period. During the past two years she had had swelling of the legs and frequent attacks of "bronchitis". Since December, 1926, she had been confined to her bed. In February, 1927, she was seen by one of us at her home in consultation with her family physician. She then developed general anasarca and novasurol was advised in addition to the digitalis she was taking. The diuretic was not effective and she did not improve. When she finally entered the Peter Bent Brigham Hospital there was marked orthopnea, extensive congestive failure with free fluid in the chest and abdomen. The arms and legs were very edematous. The heart was moderately enlarged; the rhythm was grossly irregular due to auricular fibrillation. The blood pressure was 185 mm. systolic and 100 mm. diastolic. The thyroid was not enlarged and there was no exophthalmos or tremor. The Wassermann reaction was negative. Blood counts were normal and the urine showed a slight amount of albumin and a few casts.

She improved on the customary treatment for heart failure after the novasurol was given intravenously rather than intramuscularly. She had a marked diuresis and lost all evidence of edema. The weight fell from 89.2 Kg. to 59.2 Kg. A metabolism test on June 14, 1923, was +23 per cent and on June 18 +18 per cent. Lugol's solution was started on this day and on June 25 the metabolism reading was +10 per cent. The clinical diagnosis was hypertensive heart disease with advanced congestive failure and auricular fibrillation.

Subtotal thyroidectomy was performed by Dr. F. C. Newton on June 27, 1927, under novocaine anesthesia. The gland was grossly normal in appearance and on microscopic examination showed some dilated acini. It was regarded by the pathologist as normal. The metabolic rate was +4 per cent on September 17, 1927.

The operation was advised in this case because there was some possibility that she was suffering from latent hyperthyroidism. The surgeon was advised before the operation to remove most of the gland whether it appeared normal or diseased. It was apparent that unless removal of the thyroid gland could be helpful, any individual who had this extreme degree of cardiac failure and who had remained practically bedridden for two years in spite of good medical treatment presented a hopeless problem. Should she improve on medical management it was certain that all the signs and symptoms of heart failure would promptly return on getting out of bed, as they had in the past. The astounding thing here was the fact that after the operation the patient continued in very good health. On June 20, 1929, she wrote "I have enjoyed perfect health for the past two years since the operation." She remained ambulatory and essentially free from symptoms until September, 1931, when cardiac failure returned. At this time the metabolic rate while she had congestive failure was +25 per cent. After three x-ray treatments to the thyroid gland the metabolic rate was +13 per cent. She improved somewhat but continued in varying degrees of congestive failure, developed increasing hypertension (systolic 250 mm., diastolic 110 mm.), and died on January 16, 1932. The marked improvement lasted over four years.

This case has been gone into in great detail because historically it was the starting point of subsequent work on this problem. A brief account of this case was made by Rosenblum and Levine[5]. Although it was not certain whether the thyroid gland was hyperactive before the operation, when the gland was subsequently found to be normal and the improvement was so unexpected, it was apparent that one might hope to obtain beneficial results in intractable cardiac failure by the removal of a normal thyroid gland. It was extremely difficult to obtain prop-

er cases for the operation because it was necessary to find patients who were sick enough so that if any good were accomplished it could definitely be ascribed to the operation, and yet who were not too ill to be reasonable surgical risks. Furthermore, both the patient and the surgeon had to be persuaded as to the wisdom of the procedure. This was not an easy task. It was not until several years had elapsed before a second case was treated in this way.

CASE 2. (Med. No. 40490.) A painter, aged 53, entered the Peter Bent Brigham Hospital April 20, 1932, complaining of pain in the chest. Ten years before on routine examination his blood pressure was found to be elevated. Beginning June, 1931, he noticed on walking up a hill pain in the ensiform rising up the center of his chest. He would have to stop in the street and in a few minutes the pain would lessen. He was told to reduce his weight and he lost about 25 pounds in several months. He did not improve and the attacks of pain became more troublesome. Physical examination showed marked peripheral arteriosclerosis. The heart was regular, not enlarged, and there were no murmurs. The sounds were not remarkable except that A2 was accentuated. The rest of the examination was quite satisfactory. Kidney function tests were normal and x-ray of the chest was normal. The blood Wassermann reaction and blood counts were normal. The electrocardiogram showed slightly diphasic "T" waves in all leads. The first basal metabolic rate was +20 per cent and the following day it was +12 per cent. The blood pressure was 240/135. There was no exophthalmos, thyroid enlargement, or tremor. The heart rate varied between 60 and 80. The diagnosis was essential hypertension and angina pectoris.

A subtotal thyroidectomy was advised. He returned to his home in Maine to think it over and to see if a course of metaphyllin would improve his condition. He returned June 6, 1932, because the attacks occurred on less exertion. The basal metabolic rate at that time was +23 per cent. After taking ten drops of Lugol's solution three times a day for one week it was still +24 per cent. The fact that the metabolic rate was not altered by the Lugol's solution pointed against the diagnosis of hyperthyroidism. On June 15, 1932, a subtotal thyroidectomy was performed by Dr. John Homans. The gland was normal on gross and microscopic examination. The metabolic rate during the subsequent two weeks gradually fell to +13 per cent, then to +11 per cent, and finally to +10 per cent. There was no change in the findings on physical examination.

After leaving the hospital he was distinctly better; he could walk greater distances than previously without experiencing the anginal pains although they still occurred. The basal metabolic rate on January 31, 1933, was —4 per cent and despite the cold weather he was having fewer attacks than in the warmer weather before the operation.

After the experience with the above two cases this work was continued at the Beth Israel Hospital. The first four patients who were subjected to thyroidectomy in that hospital have recently been reported[9]. As a result of the study of the first case in this latter group, it became clear that the ordinary subtotal thyroidectomy was not always sufficient to produce lasting improvement. It was found that the metabolic rate would fall to about —15 per cent and with this fall the circulation was decidedly improved. In several weeks, however, the metabolic rate was found to rise again and the patient's condition grew worse. It was evident that the remaining normal thyroid gland was capable of rapid regeneration, or at least of compensating in its function. From this it was clear that more thyroid tissue should be removed. Therefore, the second of these four cases to be operated upon (Case 4), a private patient of one of us (S. A. L.), had nine-tenths of the gland removed. The surgeon was asked to take out all he could with safety. This patient obtained complete relief from anginal attacks and even subsequently developed typical myxedema which responded satisfactorily to small doses of thyroid gland. A few weeks after this, the suggestion was made by Dr. Blumgart that a complete removal of the thyroid gland should be done. This was performed in Case 3 of that series with an excellent result. In the meantime the following cases were being similarly treated at the Peter Bent Brigham Hospital.

CASE 3. (Med. No. 42478.) A 43-year-old, unemployed, Russian Jew was first admitted to the Peter Bent Brigham Hospital on January 9, 1920, for the treatment of Buerger's disease. Pain in the legs began in 1913 and grew worse until 1915 when a right mid-thigh amputation was performed. After this he felt well until 1920 when similar pain developed in the left leg followed by gangrene of the toes, necessitating an amputation of this leg. He continued in fairly good health, although in 1925 indigestion developed, pointing to gallbladder disease. A pathological gall-bladder was found by x-ray in October, 1925.

Beginning in 1923, typical anginal attacks occurred, first of a mild nature, but gradually increasing in severity and frequency. After 1929 these attacks occurred at rest. During these years the blood pressure was found to be elevated to around 180 mm. systolic and 100 mm. diastolic. In 1930, he required, on the average, five to ten nitroglycerin pills a day. These always gave relief. He also noticed increasing dyspnea during these years so that he was continually on digitalis.

On May 8, 1931, he was admitted to the medical service for study, primarily because of the frequency of distressing attacks of angina. Physical examination showed no abnormal pigmentation. There was no exophthalmos. Ophthalmoscopic examination showed marked evidence of sclerosis of the retinal arteries. The heart was moderately enlarged to the left. The rhythm was regular. The sounds were of fair quality. There was a soft blowing systolic murmur. No diastolic murmur was heard. Blood pressure was systolic 160 mm. and diastolic 90 mm. The lungs were negative. There were no masses in the abdomen. The blood and urine were normal. The Wassermann reaction (blood serum) was negative. Electrocardiographic tracings showed left ventricular preponderance, inverted T1 and diphasic T2. Basal metabolic rates were +32 per cent, +42 per cent, +44 per cent, and +48 per cent, as determined by the method of Aub and Du Bois[10] on legless individuals.

While in the hospital he continued to have attacks of angina at rest. Thyroidectomy was strongly advised by one of us but the surgical service did not agree with this advice. As a substitute, he was given a course of x-ray therapy over the thyroid gland. From the time of discharge on May 21, 1931, until September 30, 1932, his condition re-

mained unchanged except for a gradual increase in dyspnea. Repeated basal metabolic determinations ranged around +40 per cent to +45 per cent. In September, 1932, his condition became so severe despite the x-ray therapy, Lugol's solution, digitalis, metaphyllin and other treatment that he was sent to the surgical service. The clinical diagnoses were thrombo-angiitis obliterans, hypertensive heart disease with congestive and anginal heart failure, ? cirrhosis of liver, ? thrombosis of portal vein. On December 14, 1932, a thyroidectomy was performed under local anesthesia*. Practically the entire thyroid was removed, leaving only a small bit of the left upper pole. The gland was normal in appearance, both grossly and microscopically. Although he had been having frequent attacks of angina in the hospital while at rest during the days preceding the operation, no attacks whatever occurred postoperatively. His convalescence was uneventful and he was discharged December 24, 1932, on no medication except 0.1 Gm. of digitalis folia twice a day.

He was followed in the Outdoor Department and the striking change was the complete absence of anginal pain. During the following weeks, however, dyspnea increased and he developed swelling of the abdomen. He was readmitted to the hospital on February 3, 1933. He now showed somewhat coarse, dry skin. There was considerable fluid in the abdomen. The heart showed a gallop rhythm and there was a definite pulsus alternans. There were numerous râles at the bases of both lungs. Four abdominal paracenteses were performed during his stay of two months. The dyspnea improved appreciably. The vital capacity rose from 2700 cc. to 3100 cc. There were no anginal attacks.

The recurrent ascites in this case could not be explained on the basis of ordinary cardiac failure, for it took place when the circulation seemed in very good condition. The rate of blood flow as determined by the sodium cyanide method showed a normal circulation time of 12 to 15 seconds. It seemed inconceivable that there could be a normal circulation speed in the presence of a degree of heart failure causing this much ascites. We felt that it was due either to cirrhosis of the liver or to a portal thrombosis. This latter possibility merited consideration because similar processes had previously occurred in the vessels of the legs and heart. Other laboratory studies showed the blood and urine to be normal. The phenolsulphonphthalein excretion was 40 per cent. The blood cholesterol was 240 mgm./100 cc.; blood chlorides 452 mgm./100 cc.; total protein 6.0 Gm./100 cc.; albumin 4.4 Gm./100 cc.; globulin 1.6 Gm./100 cc.; blood calcium 9.8 mgm./100 cc. Several determinations of the basal metabolic rate during this time averaged around —8 per cent.

He has since been followed in the Outdoor Department where he has received an occasional injection of salyrgan for the ascites. He has had practically no angina pectoris.

CASE 4. (Med. No. 42472.) A 61-year-old single lady was first seen in the Outdoor Department of the Peter Bent Brigham Hospital in November, 1921. She then had rheumatic pains in the right shoulder. Physical examination was negative except for a blood pressure of 175 mm. systolic and 90 mm. diastolic. She was seen occasionally during the next ten years with the same complaint. In March, 1931, typical attacks of angina pectoris first developed. These were usually associated with effort. In August, 1931, she was admitted into the hospital for study. Physical examination showed a slight hypertension, moderate enlargement of the heart, a questionable gallop rhythm and definite anterior and lateral bowing of the tibiae. The lungs and abdomen were negative. The Wassermann reaction (blood serum) was negative. Phenolsulphonphthalein excretion was 50 per cent. Blood and urine examinations were normal. The basal metabolic rate was +18 per cent. She was discharged after a week's stay and resumed normal activities, complaining of only occasional attacks of substernal pain. On October 14, 1931, she had an attack of very severe chest pain which proved to be a typical acute coronary thrombosis. She was readmitted to the hospital for this and she stayed for forty-five days. Electrocardiograph studies and other observations were quite in accord with the diagnosis of coronary thrombosis. At the time of discharge on November 27, 1931, the blood pressure was systolic 124 mm. and diastolic 60 mm., and, because of a tendency to edema of the ankles, she was kept on constant digitalis.

She remained in fairly good health, having only rare attacks of angina. In September, 1932, the blood pressure was systolic 180 mm. and diastolic 90 mm. There was a definite pulsus alternans and a few râles at the lung bases. On September 30, 1932, she had a very severe attack of angina lasting four hours and requiring morphia for relief. During the following months, anginal attacks became more frequent and began to occur while at rest. She was therefore sent in to the surgical service where a complete thyroidectomy was performed on February 4, 1933, under avertin anesthesia. The clinical diagnosis was hypertensive heart disease with congestive and anginal failure.

The thyroid gland was found to be normal grossly and microscopically. The basal metabolic rate was +13 per cent just prior to operation and +3 per cent and +1 per cent seven and fourteen days following operation. X-ray examination showed enlargement of the heart and definite evidence of Paget's disease in the tibiae and pelvic bones. The circulation time done by the sodium cyanide method was 28 seconds the day before operation and 27.5 seconds eleven days after operation. The postoperative course was entirely uneventful and she was discharged on February 17, 1933. She was frequently seen in the Outdoor Department after discharge and had no recurrences of substernal pain. She stated, "The heart pains have left me." The blood pressure varied from 180 mm. to 210 mm. systolic and 90 mm. to 110 mm. diastolic. The basal metabolic rate was —7 per cent on March 26, and —13 per cent on April 28, 1933. During May she began to act and look somewhat myxedematous. There was some pallor and she felt sleepy. There were no complaints of angina. There were some evidences of congestive heart failure in that the liver was slightly enlarged and there were râles at both lung bases. On June 9, 1933, she was begun on 0.030 Gm. of Armour's thyroid extract twice a day.

In this case, the complete thyroidectomy seemed to abolish specifically the anginal attacks in a patient who had had a previous coronary thrombosis. The mild symptoms of myxedema which developed required thyroid medication.

CASE 5. (Med. No. 41510.) A 61-year-old colored barber was first seen in the Outdoor Department of the Peter Bent Brigham Hospital on July 21, 1924, complaining of bladder trouble. In 1914 he had had an illness which might have been rheumatic fever. When a young man he had an infection producing a right facial paralysis which might have been a Bell's palsy. He had gonorrhea and a penile "blister" at the age of twenty years. In July, 1924, he was operated upon on the surgical service for a urethral fistula. Physical examination at that time showed inequality of the pupils, the left being smaller than the right. The heart was enlarged, the cardiac rhythm regular, and there was a fairly rough precordial systolic murmur. Blood pressure was 110 mm. systolic and 70 mm. diastolic. There were no evidences of cardiac decompensation. In 1925 and 1926 he under-

*This and all subsequent cases were operated upon by Dr. E. C. Cutler.

went minor operations for genito-urinary complaints.

In July, 1929, he first noticed swelling of the ankles and feet. His cardiac rhythm was irregular due to auricular fibrillation which was confirmed by electrocardiograms. He was followed in the Outdoor Department and improved on digitalis. He did tolerably well until January, 1931, when he became profoundly decompensated and thereafter remained in and out of bed as a cardiac cripple until August, 1932, when he was admitted to the medical service of this hospital. On physical examination he was found to be in respiratory distress. The retinal arteries showed slight sclerosis. The respirations were rapid and Cheyne-Stokes in character. The heart was enlarged. There was a moderate systolic murmur and a questionable short, mid-diastolic, apical rumble. The heart rate was regular at 42 per minute. Electrocardiograms showed auricular fibrillation, complete heart block, and right ventricular preponderance. There was bilateral hydrothorax. The liver edge extended four fingers below the right costal margin and there was considerable ascites. The legs were edematous up to the hips; this also involved the scrotum. Laboratory studies showed an essentially negative urine and blood. Wassermann reaction (blood serum) was also negative. Phenolsulphonphthalein excretion was 40 per cent. He improved on the usual treatment for advanced congestive heart failure and, after thirty-two days in this hospital, he was discharged as an ambulatory patient taking digitalis daily.

A week after leaving the hospital, the edema gradually began to return despite the fact that he was following our instructions with regard to activities and medication. On October 18, 1932, he was readmitted to the hospital in somewhat the same condition that he showed the first time. Thoracic and abdominal paracenteses and diuretics were required to render him free from edema. The blood serum Wassermann reaction was again negative but the Hinton was positive on two occasions. After sixty days of treatment in the hospital, he was discharged again as an ambulatory patient. Three weeks later he had to return to the hospital because of marked dyspnea and suffocation. He showed the same findings as on the previous admission indicating advanced circulatory failure. The vital capacity of the lungs was 1000 cc. on admission. The heart was markedly enlarged by x-ray examination. The rate was 30 to 36 per minute. There was a great deal of free fluid in the abdominal and thoracic cavities. He again improved, although he still showed some signs of congestive failure. The basal metabolic rates on two occasions were —14 per cent and —3 per cent. It was necessary to perform chest taps repeatedly as fluid reaccumulated despite the use of digitalis and frequent salyrgan injections. The edema kept recurring even while at rest in bed. The circulation time by the sodium cyanide method was 34 seconds on March 4. The venous pressure was 280 mm. of water. The clinical diagnoses were chronic myocarditis with congestive failure, auricular fibrillation, complete heart block, ? mitral stenosis, ? syphilitic aortitis.

On March 9, 1933, a total thyroidectomy was done under local anesthesia. The gland was normal on gross and microscopic examination. The operation was performed at a time when there was still well-marked evidence of pulmonary and peripheral edema, for it had been impossible to render him completely compensated. The postoperative course was uneventful. During the following weeks he was kept on the same diet, fluid and salt intake as he had had for weeks preceding the operation. The same dose of digitalis of 0.1 Gm. daily was also maintained. On this régime he steadily got rid of edema and lost 4 Kg. in weight without requiring diuretics or paracentesis. This is in marked contrast to the course he ran before the operation when, despite these measures, he had constantly reaccumulated fluid. The vital capacity of the lungs, the rate of blood flow, and the heart size as measured by x-ray remained unchanged. The basal metabolic rate on March 27 was —17 per cent. There was a slight tendency downward so that on May 6 when he was discharged it was —22 per cent. He gradually became ambulatory without recurrence of edema and felt more comfortable than he had for three or four years. He has been up and around, working a little in his garden, and able to come to the Outdoor Department on a street car. Subjectively he has been incomparably more comfortable than before operation.

In the face of intractable, recurrent, advanced congestive heart failure requiring frequent admissions to the hospital for prolonged bed care, complete thyroidectomy produced striking improvement. The operation was performed successfully while the patient was still suffering from moderate heart failure.

CASE 6. (Med. No. 40453.) A 40-year-old widow first entered the Peter Bent Brigham Hospital on February 5, 1932, complaining of shortness of breath of five years' duration. She had rheumatic fever at the age of 16 and erythema nodosum in 1920. Although she had had some dyspnea on exertion since the rheumatic fever, she carried on very well, going through two pregnancies, until 1926 when she had an attack of sharp knife-like pain in the precordium, palpitation and dyspnea lasting about fifteen minutes. Since then she had had frequent similar spells, both on effort and at rest, even awaking her from sleep. There also gradually developed cough, dyspnea, orthopnea and swelling of the legs. During the period from 1926 to 1932 her more or less constant state of decompensation necessitated ten hospital admissions.

Examination showed marked cyanosis and orthopnea with extreme respiratory distress. The thyroid was not palpable. The heart was considerably enlarged and the action was grossly irregular. There was a loud systolic murmur all over the precordium and a systolic thrill at the base of the heart. A soft aortic diastolic murmur was audible at the left sternal border and there was also a short mid-diastolic rumble at the apex. The blood pressure was 160/100. The lungs showed numerous musical inspiratory and expiratory râles in front and moist râles at the bases. The liver was enlarged, easily palpable and tender. There was moderate pitting edema of the legs and lower back. The joints of the hands were markedly deformed from arthritis. The blood was essentially normal. The Wassermann test was negative. The urine showed large traces of albumen which disappeared with improvement in the cardiac condition. The phthalein test was 55 per cent. The electrocardiogram showed auricular fibrillation and occasional premature ventricular beats. X-ray of the chest showed fullness in the region of the left auricle and marked cardiac enlargement, the transverse diameter measuring 17.1 cm. and the diameter of the chest measuring 24.0 cm.

After a hospital stay of forty days on the customary treatment for heart failure, she improved as she had many times in the past and was discharged in fair condition. During the following year she was sent into the hospital wards four times because of her serious condition. More complete x-ray examination revealed well-marked calcification of the pericardium. When she entered the hospital on March 3, 1933, her state was desperate. Venesection helped considerably. She again improved; the vital capacity of the lungs rose from 700 cc. to 1100 cc.; the circulation time (cyanide method) fell from 39 to 25 seconds; four metabolism readings averaged around —3 per cent; blood cho-

lesterol was 145 mgm. per cent. The diagnoses were aortic and mitral stenosis, auricular fibrillation, calcified pericardium and advanced congestive failure.

Because of the hopeless condition of the patient, who had been practically bedridden for several years requiring sixteen hospital admissions, a complete thyroidectomy was performed on April 7, 1933, under avertin and novocaine anesthesia. The postoperative course was uneventful. The basal metabolic rate fell gradually to —12 per cent and then to —30 per cent on May 19, 1933. X-ray of the heart on April 28 showed the size to be slightly larger, now measuring 17.6 cm. The blood cholesterol was 140 mgm. per cent (unchanged); the vital capacity of the lungs was 1100 cc.; the circulation time was 35 seconds and the blood pressure 130 mm. systolic and 90 mm. diastolic. The diet, fluid and salt intake, and digitalis dosage were the same before as after the operation.

There was a striking improvement in her subjective symptoms. She felt very much better, was no longer aware of her heart beat and could lie flat in bed for the first time in years. She became ambulatory and then was discharged. On subsequent examinations in the Outdoor Department it was apparent that she was developing myxedema. On June 9 her face was slightly puffy, she felt lethargic and the metabolic rate was still —30 per cent. Her circulation had improved so much that she began to go shopping in town and exerted herself unduly. Congestive heart failure again developed, requiring readmission to the hospital. This time the ordinary treatment together with thyroid extract (Armour's) 30 mgm. twice daily caused a striking improvement, the metabolic rate rising to about —15 per cent. At present she is up and about feeling better than she has for some years. Incidentally, a state of chronic asthmatic bronchitis from which she suffered for a long time has apparently disappeared since the thyroidectomy and there have been no attacks of chest pain.

CASE 7. (Med. No. 42472.) A 70-year-old man entered the Peter Bent Brigham Hospital on March 25, 1933, complaining of marked dyspnea. At the age of seventeen years he had suffered a severe accident, and as a sequel he was supposed to have had "mitral leakage". The present illness had begun about four years before admission when he first noticed shortness of breath on exertion and substernal pain. Later the chest pain occurred also at rest. His condition gradually grew worse so that in recent months he was completely incapacitated. The blood pressure was known to have been elevated in the past to between 180 and 200 mm. systolic. A few weeks before admission he had an attack of very severe substernal pain radiating to both arms, which required several injections of morphine sulphate for relief. After this the shortness of breath grew very much worse so that he had to remain in a chair all day long. Marked edema of the legs and abdomen developed and he became disoriented.

On physical examination he showed orthopnea and Cheyne-Stokes breathing. The heart was markedly enlarged. There was an irregular cardiac rhythm due to numerous extra systoles. The rate was 90 per minute. There was a loud, precordial systolic murmur. The blood pressure was systolic 156 mm., diastolic 88 mm. The lungs showed marked congestion, many râles throughout the flatness at both bases due to fluid. The liver was considerably enlarged and there was gross edema of the lower back and legs.

The blood examination was negative except for a leukocytosis of 15,000. Urine showed a very slight trace of albumin and the specific gravity ranged between 1.015 and 1.021. Phenolsulphonphthalein excretion was 29 per cent. The Wassermann test was negative. Electrocardiographic tracings showed premature auricular and ventricular beats, delayed a.v. conduction (P.R. = 0.24) and ventricular complexes of distinctly low amplitude. The vital capacity of the lungs ranged between 700 and 1200 cc.

He was treated in the ordinary way for advanced cardiac failure. The pleural cavities were repeatedly tapped. Although his condition improved somewhat, the situation remained desperate. Because of certain unusual domestic circumstances he could not be sent home in this condition, nor could he continue very long in the hospital. The clinical diagnoses were coronary thrombosis and congestive heart failure. Realizing that the outlook was extremely gloomy no matter what was done, a complete thyroidectomy was advised as the only hope. This was done under local anesthesia on April 11, 1933, at a time when the patient was still irrational and having well-marked respiratory distress with Cheyne-Stokes breathing. He died eight hours after the operation. The thyroid gland was entirely normal. Postmortem examination of the heart showed occlusion of the left descending coronary artery, an old myocardial infarct and a real aneurysmal bulging on the wall of the left ventricle. This was the only operative mortality in the entire series and yet hardly deserves to be called such. It seemed quite certain that the patient would die within days under ordinary management, and the operation was tried as a last resort to see whether, even under these extreme circumstances, some good might be accomplished.

CASE 8. (Med. No. 42822.) A 53-year-old railroad employee entered the medical service of the Peter Bent Brigham Hospital on April 4, 1932. He had had four attacks of rheumatic fever—at the ages of nine, twenty-one, thirty-three and forty-four years. In 1924 he was first seen in the Outdoor Department when a definite diagnosis of mitral stenosis and auricular fibrillation was made. On constant administration of digitalis he carried on fairly well for the following seven to eight years. Because of increasing dyspnea he entered the hospital.

In April, 1932, examination showed moderate respiratory distress. There was marked cardiac enlargement; the rhythm was absolutely irregular. There was a loud systolic and a rumbling diastolic murmur at the apex. The blood pressure was systolic 140 mm., diastolic 70 mm. The lungs showed a few râles at the bases posteriorly. The liver extended a handbreadth below the right costal margin and was tender. There was a moderate amount of edema of both legs extending up to the knees and over the lower back.

Blood and urine examinations were normal. Phenolsulphonphthalein excretion was 50 per cent. The Wassermann reaction was negative. X-rays of the chest showed considerable enlargement of the heart both to the right and to the left, a prominence in the region of the left auricle but no evidence of adhesive pericarditis. Electrocardiographic tracings were typical of auricular fibrillation.

On routine treatment he improved strikingly and after twenty-five days he was discharged to the Outdoor Department. His condition remained satisfactory and he was able to work five hours a day until September 22, 1932, when he was readmitted to the hospital. His condition was much the same as on the first admission, but he again improved after a stay of six weeks. The improvement, however, did not continue and on April 11, 1933, he returned. He again improved. Physical findings were as noted above. The vital capacity at the time of admission was 1800 cc. The circulation time was 52.5 seconds. Three determinations of the basal metabolic rate on different days were +16, +2, and —6 per cent. The blood cholesterol was 115 mgm. per cent. Although slight subjective improvement occurred, his condition reached a stationary level. The clinical diagnoses were rheumatic heart dis-

ease, mitral stenosis and insufficiency, auricular fibrillation and congestive heart failure.

On May 19, 1933, a complete thyroidectomy was done under local anesthesia. The gland was normal on gross and microscopic examination. Postoperative convalescence was uneventful. During four weeks after the operation he was maintained on the same régime of food, fluid and medication, but his weight remained constant. Vital capacity increased to 2250 cc. and the circulation time diminished to 35 seconds. The basal metabolic rate gradually fell to —24 per cent. Blood cholesterol was 125 mgm. per cent. He gradually became ambulatory and while up and about he was free from dyspnea and evidences of recurring cardiac failure. He was discharged on June 17, 1933. One month later a moderate degree of dyspnea developed and there was some edema of the legs. The vital capacity had fallen to 1500 cc. In this case the improvement was definite but slight.

CASE 9. (Med. No. 43101.) A 45-year-old tailor entered the Peter Bent Brigham Hospital on April 27, 1933, complaining of swelling of the abdomen. The family history and past history were not significant. Three and one-half years before admission he first noticed a gradual increase in the size of his abdomen. Later there had followed swelling of the ankles and shortness of breath on exertion. He entered another hospital on November 15, 1929, where an abdominal paracentesis was done at which time the liver was found to be enlarged. An abdominal operation was then performed. Cirrhosis of the liver was discovered and an omentopexy was done for relief. At this hospital the heart was found to be enlarged, the rhythm grossly irregular and systolic and diastolic murmurs were heard. Since that time, although taking digitalis constantly and receiving diuretics, he had required tapping of the abdomen every two or three weeks. He had been a chronic cardiac cripple during this period of three and one-half years.

In April, 1933, examination showed a thin man sitting up in bed with moderate breathlessness. The thyroid was not felt. The retinal arteries showed slight calibre changes. The veins in the neck were somewhat distended. The heart was considerably enlarged. The rhythm was grossly irregular (electrocardiogram confirmed the diagnosis of auricular fibrillation). There was a moderately loud systolic murmur and a faint mid-diastolic rumble at the apex. The heart rate was not rapid. The blood pressure was 100 mm. systolic and 80 mm. diastolic. The lungs showed a small amount of free fluid in the left base and a few moist râles at both bases. The abdomen was greatly distended with fluid. After 15,000 cc. were removed by tapping, the liver edge was easily felt three fingers below the right costal margin. The spleen was not felt. There was marked peripheral pitting edema.

The urine was essentially negative. Blood count and Wassermann reaction were normal. The phenolsulphonphthalein excretion test was 35 per cent. Specific gravity of the ascitic fluid was 1.013, the total protein 3.3 Gm. per cent, albumin 1.8 Gm. per cent, and globulin 1.5 Gm. per cent. Studies done on the blood at the same time showed a total protein of 5.4 Gm. per cent, albumin 3.0 Gm. per cent, and globulin 2.4 Gm. per cent. Blood cholesterol was 150 mgm. per cent. The liver function test (bromsulphalein) showed 35 per cent return of the dye after ten minutes and 0 per cent in thirty minutes. The vital capacity was 2500 to 2600 cc. Circulation time was 35.5 seconds before, and 44.5 seconds after abdominal paracentesis. Basal metabolic rates ranged from —3 per cent to —17 per cent. X-ray of the heart showed considerable enlargement with a well-marked fullness in the region of the left auricle. No intracardiac calcification or evidence of adhesive pericarditis could be made out.

During a course of twenty-nine days of care on the customary routine treatment, consisting of digitalis, repeated injections of salyrgan and repeated abdominal taps, his condition improved very little. Inasmuch as the outlook seemed hopeless, operation was advised. The clinical diagnoses were rheumatic heart disease, mitral stenosis and insufficiency, auricular fibrillation, cirrhosis of the liver, and ? adherent pericardium.

On May 26, 1933, a complete thyroidectomy was done under novocaine anesthesia. Pathological examination of the thyroid gland showed it to be entirely normal both grossly and microscopically. On the fourth day postoperatively signs of tetany were noted. This was treated successfully with parathormone intramuscularly and calcium orally and intravenously. Following operation his condition was slightly better. The vital capacity rose from 2500 to 2900 cc. Circulation time was 22 seconds on June 13. Basal metabolic rates were —13 per cent, —14 per cent, —20 per cent, —17 per cent and —12 per cent on different days, the last being five weeks after operation. Because only slight improvement had been obtained by thyroidectomy and because there was nothing to look forward to except a protracted period of invalidism and suffering, it was thought that a pericardial exploration was advisable. Although no x-ray evidence was obtained of adhesive pericarditis, the recurring ascites, with little evidence of peripheral edema or of pulmonary congestion, suggested the Pick's syndrome. Pericardiotomy was performed on July 29, 1933, and the patient succumbed the following day. Postmortem examination did not show any adhesive pericarditis. There was a well-marked mitral stenosis. The liver and spleen were both enlarged and showed the white frosting and thickening of the capsule typical of the findings that occur in Pick's disease.

Complete thyroidectomy in this case produced only a slight improvement in the clinical state. It is interesting that the recurring ascites was primarily due to a "Zukergussleber."

CASE 10. (Med. No. 42229.) A 29-year-old housewife was first admitted to the medical service of the Peter Bent Brigham Hospital on December 27, 1932. The family history was significant in that the mother died at the age of 45 of hypertension. The patient had had numerous infections during childhood, but no history of rheumatic fever or chorea. In 1924, she first knew that she had a "leaky valve" of the heart although she led a fairly active life until two years ago when shortness of breath developed. This gradually grew worse and six weeks ago swelling of the ankles first was noted. She was put to bed, given digitalis, and her symptoms improved temporarily, to recur again shortly before admission.

On examination there was moderate respiratory distress and marked cyanosis of the skin. The thyroid was not palpable. The veins in the neck were moderately distended. The heart was considerably enlarged and the rhythm was typical of auricular fibrillation. Electrocardiograms confirmed this and also showed frequent premature ventricular beats. At the apex there was a harsh systolic and a rumbling diastolic murmur. The blood pressure was approximately 130 mm. systolic and 80 mm. diastolic. The lungs showed many moist râles at the bases. The liver was considerably enlarged. There was a moderate pitting edema of the legs and lower back. The blood showed a leukocytosis of 20,000. The icteric index was 25. The Wassermann reaction was negative. She remained on the medical service for seventy-nine days and gradually improved on digitalis and injections of salyrgan. She lost eight Kg. in weight and was discharged on March 24, 1933, free of edema.

On April 12, 1933, she was readmitted with marked evidences of congestive heart failure. At this time examination of the heart was essentially the same

as before. A slight secondary anemia had developed. The phenolsulphonphthalein excretion was 28 per cent. The blood urea nitrogen was 38 mgm. per cent. The blood cholesterol was 140 mgm. per cent. Three basal metabolic rate readings on different days were —3 per cent, —9 per cent, and +5 per cent, the last test being on June 3, 1933. The circulation time was 40 seconds. The vital capacity of the lungs was 1300 cc. This improved to 1980 cc. The blood pressure now was 145 mm. systolic and 65 mm. diastolic. Venous pressure was 195 mm. of water. During the course of fifty-four days of medical treatment, only slight improvement was obtained. There was evidence that she would remain bedridden and therefore surgery was advised. The clinical diagnoses were rheumatic heart disease, mitral stenosis and insufficiency, auricular fibrillation, congestive heart failure, and chronic nephritis.

On June 5, 1933, a complete thyroidectomy was performed under novocaine anesthesia. Gross and microscopic examinations of the gland were normal. The postoperative course was rather stormy for a few days, the blood pressure being almost imperceptible and the heart rate running as high as 150 per minute. On increasing doses of digitalis and following intravenous glucose administration, she improved markedly. Metabolic rates on July 19, July 25, and August 2 were —18 per cent, —20 per cent, and —21 per cent respectively. Phenolsulphonphthalein excretion ranged around 20 per cent. The vital capacity varied from 1500 to 1700 cc. During the two months which have followed operation, there was at first an apparent clinical improvement as compared with the preoperative state, but latterly the condition has grown worse. There is increasing evidence of renal insufficiency. Urine consistently showed a trace of albumin and numerous granular casts. Her face has definitely the appearance of myxedema for which she was given 15 mgm. of thyroid gland twice daily.

This patient, with advanced intractable heart failure from mitral stenosis and auricular fibrillation, showed a slight temporary improvement after a complete thyroidectomy. The operation has so far proved to be a failure in this instance. A complicating nephritis may be an important reason for the poor result.

CASE 11. (Med. No. 43259.) A 59-year-old railroad employee entered the Peter Bent Brigham Hospital on July 1, 1933. The past history and family history were irrelevant. Two years ago he first noticed pain in his chest, particularly while walking. This was a substernal pressure sensation, which regularly radiated to both arms, especially to the left. An attack would last from five minutes to two hours. At first, if he stopped, the pain would lessen, but during the last twenty months they had occurred frequently at rest and especially at night. The attacks grew more distressing and whereas formerly often relieved by nitroglycerine, more recently he has obtained no such relief. There had gradually developed attacks of dyspnea and suffocation at night, sometimes associated with pain and at other times independent of it. During recent months there had been moderate swelling of the ankles. The attacks were occurring four to five times a day before entering the hospital and he stated that he would rather die than bear them any longer.

Physical examination showed obvious respiratory distress and definite Cheyne-Stokes breathing. There was slight cyanosis. The thyroid was not enlarged. The heart was considerably enlarged. The rhythm was regular. There was a slight apical and basal systolic murmur and a well-marked diastolic murmur. There was a definite gallop rhythm. The blood pressure was 140 mm. systolic and 45 mm. diastolic. The lung showed a moderate number of moist râles at the bases. There was slight pitting edema of the ankles. The liver was slightly enlarged and tender.

Laboratory tests showed an essentially negative urine. The blood counts were normal. The Wassermann test was positive. The phenolsulphonphthalein excretion was 38 per cent. The blood urea nitrogen was 17 mgm. per cent. An x-ray of the chest showed well-marked cardiac enlargement and calcification of the arch of the aorta. There was a slight amount of free fluid at both bases. The circulation time was 35 seconds. The vital capacity was 2700 cc. Basal metabolic rates were +14 per cent and two days later +3 per cent. The clinical diagnoses were syphilitic aortic insufficiency, congestive heart failure, and angina pectoris.

Six months before entry into the hospital he had received a course of antiluetic treatment consisting of mercury and potassium iodide followed by intravenous injections of salvarsan. His condition did not improve as a result of this but, in fact, grew worse. The attacks were so agonizing that the patient pleaded for relief and spoke about committing suicide if it could not be obtained. A total thyroidectomy was therefore performed under local anesthesia on July 7, 1933. The gland was normal both on gross and microscopic examination. Although he had been having daily attacks of severe anginal pain for a long time before entry into the hospital and during the week preceding operation while in bed, he never had a single attack of pain after thyroidectomy. This dramatic change took place notwithstanding the fact that the metabolism reading was yet unchanged during the two weeks postoperatively. Despite this disappearance of anginal attacks, the element of congestive heart failure as indicated by dyspnea was only temporarily alleviated although he was completely digitalized and kept on a maintenance dose of .1 Gm. twice daily. After the first ten days he began to notice some shortness of breath at night. Râles persisted at the bases of the lungs. The vital capacity did not change. The reading was 2700 cc. on July 14. The circulation time was 35 seconds. Although at this time he still had some dyspnea at rest, he was most jubilant because of the absence of pain. He was discharged on July 22 as an ambulatory patient. Unfortunately, a few days after going home the attacks of nocturnal dyspnea, without any pain, grew worse and he died of acute pulmonary edema on July 26, 1933.

CASE 12. (Med. No. 43307.) A 43-year-old Negro laborer was admitted to the Peter Bent Brigham Hospital on July 13, 1933, complaining of shortness of breath. During his youth he had had three gonorrheal infections and on one occasion a small penile "sore". As a sequel of these infections, he had had moderate dysuria and nocturia. For the past four years he had had shortness of breath on exertion which had become gradually but progressively worse until two years ago when orthopnea and attacks of paroxysmal, nocturnal dyspnea developed. At this time he entered another hospital for treatment and after a stay of four months was discharged to resume his usual activities. Until six weeks before entry he did fairly well with only infrequent attacks of nocturnal breathlessness. At this time, the symptoms became much worse and peripheral edema first appeared. Because of repeated and prolonged attacks of severe nocturnal dyspnea occurring during the week prior to entry, he was sent into the hospital. Physical examination showed a well-developed colored man, sitting up in bed, breathing with difficulty. His respirations were Cheyne-Stokes in character. The optic fundi showed numerous small hemorrhages and marked calibre changes of the retinal arteries. The thyroid was not palpable. The heart was markedly enlarged to the left. The cardiac rhythm was grossly irregular (auricular fibrillation confirmed by elec-

trocardiograms). There was a harsh precordial murmur. No diastolic murmurs were heard. The blood pressure was systolic 210 mm. and diastolic 144 mm. There were numerous moist râles at the lung bases. A smooth, tender liver edge was felt a handbreadth below the right costal margin. There was extensive edema of the legs and lower back. Laboratory studies showed blood count and Wassermann reaction to be negative. The urine consistently showed a very slight trace of albumin with a specific gravity which varied between 1.010 and 1.015. The phenolsulphonphthalein excretion was 40 per cent. The blood cholesterol was 200 mgm. per cent. The vital capacity and circulation speed were 2250 cc. and 55 seconds respectively on July 26. A basal metabolic rate on August 1 was —7 per cent. On the usual therapy of phlebotomy, digitalis, and injections of salyrgan, he improved strikingly, losing about 40 pounds in weight with complete disappearance of the edema. The clinical diagnosis was hypertensive heart disease and auricular fibrillation with marked congestive failure. Because of the recurrence of gross congestive heart failure with nocturnal dyspnea and the hopeless outlook for the patient if he became ambulatory again, thyroidectomy was advised.

The operation was performed on August 3, 1933, under novocaine anesthesia. His postoperative convalescence has been entirely uneventful. At the present time, no statement can be made in regard to the possible beneficial effects of the operation because, although he feels quite well, too short a time has elapsed since the operation.

DISCUSSION

A series of twelve patients, suffering from various far-advanced forms of heart diseases, upon whom thyroidectomy was performed has been reported. The fortuitous experience on Case 1, operated upon in 1927, in which marked improvement seemed to follow a subtotal thyroidectomy of a normal gland, was the starting point of this study. At a later date it was proposed by one of us (S. A. L.) that further work on the same problem be carried out. These cases were similarly treated and recently reported[9]. Here evidence was presented showing that the removal of normal thyroid glands was helpful in the treatment of heart disease. There was ample clinical and physiological experience to enable one to predict that this might occur. The physiological work of Blumgart[11] has shown that when the metabolism is low there need be no objective or subjective evidence of cardiac failure even when the circulation is sluggish and the rate of blood flow diminished. In other words, when the basal demands are diminished as they are in myxedema, the lowered state of the circulation is ample to meet the requirements of the body. This, however, does not explain why a patient suffering from anginal attacks, either on effort or especially at rest, should be helped by thyroidectomy. Patients with angina generally have no congestive failure and have a normal rate of blood flow in contrast to the slow rate of blood flow in congestive heart failure. Furthermore, evidence is presented here to show that the attacks of angina disappeared after thyroidectomy during a time when the metabolism was still unchanged and could not, therefore, be related to alteration in the speed of the circulation or to the basal oxygen demands of the body. In fact, the circulation time in Case 11 was unaltered as compared with the preoperative rate. It seems likely that in dealing with the problem of angina the removal of the thyroid gland has at least one important effect entirely independent of changes in metabolism, somehow related to reflex or humoral alterations, and possibly linked up with the adrenal glands. One might prophesy that injection of adrenalin, which has been shown to reproduce anginal attacks in those suffering from angina pectoris[12], might fail to do so after thyroidectomy. One is not to infer from this that variations in the basal metabolic rate are entirely without influence in the anginal state. We wish to emphasize a possible rôle of this other factor.

At the start of this work, a subtotal thyroidectomy was performed. The surgeons were constantly urged to take out more and more of the gland because in some cases it became evident that after a temporary fall in the metabolic rate the level rose again in several weeks. This clinical observation and experiments on animals indicate that small amounts of normal thyroid tissue have great powers of regeneration. Despite this, marked clinical improvement did occur in Case 1 of this series and Case 4 previously reported[9]. In the latter instance, the surgeon was advised to take out as much of the gland as possible. As far as could be judged, 1/10 remained. Because of the uncertainty of leaving varying amounts of glandular tissue behind, the policy was suggested by Blumgart of performing complete removal of the gland. It was felt that should evidence of myxedema develop subsequently, the patient might readily be given sufficient thyroid gland by mouth to maintain a metabolic rate at the desired level. Whether it will eventually be advisable to perform total ablation or a very generous subtotal thyroidectomy remains for future study. It will depend upon the differences in risk of the two operations, the question of whether the parathyroid glands will present greater or lesser difficulties in one procedure or the other, and upon the frequency and importance of postoperative myxedema and other complications.

In this study, only those suffering from hopeless, incurable, and intolerable heart diseases were selected. The test given to this new procedure, therefore, was the most severe that could be chosen. This was done deliberately. In the first place, in carrying out a new form of treatment that is not in itself simple, it does not seem fair to risk the health or life of any except those who are otherwise helpless. In the second

place, it was evident that if such extreme disability could be improved, this method of treatment must be valid. On the other hand, it must also be appreciated that many of these cases were so desperate that if slight improvement occurred, it might not be sufficient to keep pace with the inherent progressive nature of the underlying disease. A patient bedridden in distress might be improved and still remain bedridden without distress. It is only if improvement were greater that such a patient might become ambulatory. These different types of response were noted in the various cases reported here. It is obvious that if there are no handicaps in the treatment itself, improvement in milder forms of heart disease would result in greater apparent relief.

At the outset, one must consider the operative mortality of this surgical treatment. In these twelve cases there was only one postoperative death. As has been explained above, this single mortality is no reflection on the operation, which was performed deliberately as a very last desperate resort, the patient being moribund at the time. One can, therefore, say that the surgical procedure is a very safe one even in the face of the most advanced forms of heart disease.

Among these twelve cases (Table 2) there were four that had angina pectoris. One of these had typical angina pectoris with hypertension; the second had angina pectoris, hypertension and Buerger's disease; a third had hypertension and anginal attacks following a previous coronary thrombosis; and a fourth had angina, syphilitic aortitis with aortic insufficiency and cardiac asthma. There were four with mitral stenosis and auricular fibrillation, one of whom also had aortic stenosis and calcified pericardium. The remaining four had non-valvular heart disease and congestive failure. Three of these had auricular fibrillation, one of whom also had complete heart block and another also had hypertension; the fourth had marked orthopnea and cardiac asthma following an attack of coronary thrombosis. In all instances the degree of disability, whether due to heart failure, angina, or both, was extreme. In the cases of angina pectoris, one patient (Case 2), who had a partial thyroidectomy, was somewhat improved although attacks recurred with less severity and frequency. In Cases 3, 4, and 11 the attacks of angina entirely disappeared. Of the four patients with mitral stenosis and auricular fibrillation, one (Case 6) was markedly improved; two (Cases 8 and 9) were slightly improved; and in the fourth (Case 10) no significant change took place. Among the four non-valvular cases there was extraordinary improvement in one (Case 1) and marked improvement in the second (Case 5). The third (Case 12) has only recently been operated upon and although doing well, it is too early to judge the result. The fourth was the only fatality, referred to above.

Realizing the stubbornness and refractoriness of these cases to all known ordinary methods of treatment, the results just described are very impressive. Cases 1, 5, and 6 were enabled to be ambulatory after being bedridden for months and years. Those suffering from anginal pain were particularly relieved from this symptom by the operation. To have had some failures among such patients is not surprising. There were two instances (Cases 3 and 9) in which a complicating cirrhosis of the liver proved to be a stumbling block to an improvement which otherwise might well have occurred. In one case (Case 10) a concomitant nephritis appeared to be mainly responsible for the failure.

From this brief experience it is impossible to predict whether the non-valvular or the valvular cases are likely to receive the most help. It is quite definite, however, that those suffering from angina are more certain to obtain considerable relief. This we believe will be particularly true of those suffering from angina who have no additional congestive heart failure. In the selection of cases, due regard must be paid to the presence or absence of those complicating conditions which are in a measure independent of the heart, such as cirrhosis of the liver, nephritis, hypertension, etc., which one may expect to persist even after improvement in the circulation It is also of interest that in one patient a long-standing asthmatic bronchitis disappeared after thyroidectomy.

Apart from the clinical and practical aspects of this problem as detailed above, a few other points developed which are worthy of mention. The measurements of the rate of blood flow as determined by the cyanide method showed no conspicuous alterations as a result of the operation. In two cases, when the metabolism was considerably depressed, the circulation time was practically the same as before operation when the metabolism was normal. In a third, the speed of blood flow was slightly but distinctly faster than when the metabolism was low. The vital capacity likewise showed inconspicuous differences in most of these cases.

The blood cholesterol, which is generally increased in spontaneous myxedema[13], was unaffected in the cases during at least a short time after myxedema had developed. There was one instance (Case 10) in which the preoperative cholesterol figure was 130 mgm. per cent and this rose to 260 mgm. per cent seven weeks after the operation. There seems to be a distinct lag between the fall of metabolism and the development of cholesterinemia. Very likely some of the other cases will subsequently show alteration in the cholesterol content of the blood if not given thyroid gland. The same may also be said concerning the relation between metabolism and the clinical evidence of myxedema. On sev-

TABLE 1

Case No.	Age	Sex	Clinical Diagnosis	Degree of Failure	Operation	Result
1	61	Female	Hypertensive Heart Disease Auricular Fibrillation	Congestion (marked)	Subtotal Thyroidectomy	Cardiac failure markedly improved
2	53	Male	Essential Hypertension Angina Pectoris	Angina (severe)	Subtotal Thyroidectomy	Angina somewhat improved
3	43	Male	Thromboangiitis Obliterans Hypertensive Heart Disease Angina Pectoris ? Cirrhosis of Liver ? Thrombosis of Portal Vein	Congestion (moderate) Angina (severe)	Total Thyroidectomy (small bit of upper pole left)	Angina relieved Cardiac failure moderately improved
4	61	Female	Hypertensive Heart Disease Angina Pectoris Coronary Thrombosis (old)	Congestion (moderate) Angina (severe)	Total Thyroidectomy	Angina completely relieved Cardiac failure slightly improved
5	61	Male	Chronic Myocarditis Complete A-V Heart Block Auricular Fibrillation	Congestion (marked)	Total Thyroidectomy	Cardiac failure markedly improved
6	40	Female	Rheumatic Heart Disease Mitral Stenosis and Insufficiency Aortic Stenosis Auricular Fibrillation Calcification of Pericardium	Congestion (marked)	Total Thyroidectomy	Cardiac failure markedly improved
7	70	Male	Coronary Thrombosis	Congestion (marked)	Total Thyroidectomy	Died within one day following operation
8	53	Male	Rheumatic Heart Disease Mitral Stenosis and Insufficiency Auricular Fibrillation	Congestion (marked)	Total Thyroidectomy	Cardiac failure slightly improved
9	45	Male	Rheumatic Heart Disease Mitral Stenosis and Auricular Fibrillation Cirrhosis of the Liver	Congestion (moderate)	Total Thyroidectomy	Slight improvement
10	29	Female	Rheumatic Heart Disease Mitral Stenosis and Insufficiency Auricular Fibrillation Chronic Nephritis	Congestion (marked)	Total Thyroidectomy	No improvement
11	59	Male	Syphilitic Aortitis and Syphilitic Aortic Insufficiency Angina Pectoris Cardiac Asthma	Angina (severe) Congestion (moderate)	Total Thyroidectomy	Angina completely relieved Cardiac failure unimproved
12	43	Male	Hypertensive Heart Disease Auricular Fibrillation	Congestion (marked)	Total Thyroidectomy	?

TABLE 2

Case	Date of Operation	Basal Metabolic Rate (%)		Vital Capacity (cc.)		Circulation Time (Seconds)		Blood Cholesterol (mgm. %)	
		Before Operation	After Operation	Before Operation	After Operation	Before Operation	After Operation	Before Operation	After Operation
1	6/27/27	+23—6/14/27 +18—6/18/27 +10—6/25/27	+4 —9/17/27 +25—9/26/30 +13—10/18/30						
2	6/15/32	+20—4/21/32 +23—6/7/32 +24—6/14/32	+13—6/23/32 +10—6/25/32 +10—6/28/32				26—2/7/33 8—2/23/33 15—4/9/33		240—2/7/33 260—2/23/33
3	12/14/32	+48—5/1/31 +43—7/5/31 +42—2/5/32 +52—11/1/32	+35—12/20/32 +2 —2/3/33 +1 —3/31/33 +2 —7/12/33	2600—5/1/31 2500—7/5/31 2500—2/5/32 2300—11/1/32	2000—2/3/33 2900—2/23/33 3400—4/7/33				100—3/15/33
4	2/4/33	+18—8/7/31 +13—9/23/32 +15—2/3/33	+3 —2/11/33 —7 —3/27/33 —13—4/28/33	1200—9/23/32 1650—1/20/33 1500—4/28/33	1600—3/31/33	28—2/3/33	27.5—2/15/33		
5	3/9/33		—6 —3/15/33 —9 —3/27/33 —14—4/6/33	1000—2/1/33 1800—2/23/33 1950—3/5/33	1400—3/15/33 1200—4/6/33 1900—5/3/33	34—3/4/33	35—3/15/33 33—5/6/33		
6	4/7/33	—14—2/8/33 —3 —2/23/33 —5 —3/23/33	—27—4/20/33 —22—5/3/33 +4 —4/11/33 —12—4/20/33 —18—4/27/33 —26—5/12/33 —30—6/9/33 —4 —6/19/33	1000—3/13/33 1000—3/26/33 1100—4/2/33	1000—5/7/33 1100—5/14/33 1050—7/21/33	25—4/2/33	25—4/21/33	145—3/31/33	140—5/21/33
8	5/19/33	+16—4/28/33 +2 —5/11/33 —6 —5/16/33	—12—5/29/33 —19—6/5/33 —24—6/9/33 +2 —8/7/33	1700—12/5/32 1600—4/10/32 1500—4/27/32 1600—5/11/32	1800—6/1/33 1900—6/5/33 2250—6/15/33 1600—7/14/33	52.5—4/21/33 45—5/11/33	35—6/13/33	115—5/2/33	125—6/21/33
9	5/26/33	—3 —5/13/33 —13—5/18/33	—13—6/3/33 —20—6/9/33 —17—6/23/33 —12—6/30/33	2100—5/1/33	2500—6/3/33 2600—6/15/33 2900—6/30/33 2900—7/16/33	35—5/11/33	42—6/13/33	130—5/2/33 150—5/12/33	260—7/14/33
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11	7/8/33	+14—7/3/33 +3 —7/7/33	+9 —7/13/33 +2 —7/20/33	3500—7/6/33	2700—7/14/33 2900—7/18/33	55—7/6/33 55—7/26/33	35—7/21/33	200—7/28/33	
12	8/3/33	—7 —8/1/33	—12—8/10/33	2250—7/26/33					

eral occasions at a time when the metabolic rate was in the vicinity of —20 per cent a few weeks after the operation, there was no subjective or objective evidence of myxedema, but at some later time such evidence did develop although the metabolic rate was no lower. It must be appreciated that clinical myxedema developed to a greater or lesser extent in five of these twelve cases and in at least one of the four previously reported. They were, however, very satisfactorily controlled by the administration of thyroid gland. In none of these cases after complete removal of the gland has the basal metabolic rate fallen to the very low figures frequently seen in idiopathic myxedema. In fact, it generally took a few weeks before a level of about —20 per cent was reached. It may be that if some of these patients had not been given thyroid medication, lower levels would have been attained. This complication, and others that the operation may entail, remain for future study.

CONCLUSION

Partial or complete removal of the normal thyroid gland was performed in twelve patients suffering from the most severe forms of heart disease. There were four with angina pectoris, four with valvular heart disease and auricular fibrillation, and four with non-valvular congestive heart failure. They were all hopeless cardiac cripples and, for the most part, bedridden. Improvement in six was marked. In three, it was slight to moderate. In one, there was no improvement. In one, sufficient time has not elapsed to judge. There was one operative mortality in a patient who was moribund at the time of the operation. The most promising group at present seem to be those suffering with angina pectoris.

This work was a direct and logical sequel of the clinical experience of the care of ordinary thyrocardiacs. The results here detailed were sufficiently beneficial to warrant the conclusion that this new procedure will prove helpful in the treatment of properly selected patients suffering from various forms of heart disease who do not improve on the measures customarily used.

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CLINICAL ASPECTS OF PERSISTENT RIGHT AORTIC ROOT*

BY HOWARD B. SPRAGUE, M.D.,† CARL H. ERNLUND, M.D.,† AND FULLER ALBRIGHT, M.D.†

THE development of the blood supply to the cephalic end of the vertebrate embryo would appear to offer almost unlimited possibilities for atypical arrangement of vessels. This lies in the fact that an extensive system of branchial arches is elaborated between dorsal and ventral aortae only to undergo degeneration in some of its components and to reach a condition at birth in which a bilaterally symmetrical distribution of vessels has become an asymmetrical definitive aorta, pulmonary artery, and carotid-subclavian system. Not only has the arrangement become unbalanced laterally but also dorsoventrally by the persistence in part of the ventral paired aortae. Thus with the normal rotation of the heart as an additional variable there is a three dimensional possibility for numerous anomalies.

It seems probable, however, that this variation in great vessel development becomes of clinical importance only when one condition exists, namely, the complete persistence, either as blood conveying tubes or fibrous remnants, of a vascular ring encircling the primitive foregut which, in the fully mature fetus, has become the trachea and esophagus.

The blood vessel distribution in the embryo immediately distal to the heart consists of a common arterial trunk or sac from which is given off a series of six branchial arches connecting ventral and dorsal paired aortae. These arches do not develop, according to Congdon[1], following the regular diagrammatic scheme usually illustrated in drawings, but are in a continuous

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state of growth in which the first and second arches have already practically disappeared by the time the more caudal have been completed. The surviving elements of the ventral paired aortae become the external carotids while the third arches and the dorsal aortae cephalad to this junction remain as the internal carotids. The left fourth arch becomes the definitive aorta, the right fourth forms the innominate artery through the disappearance of the right dorsal aorta between the right subclavian and the point of fusion of the two dorsal aortae. The fifth arches are unimportant and disappear early. The sixth arches form the pulmonary arteries and ductus arteriosus, the latter by survival on the left side, but the distal end of the right sixth arch is obliterated.

It can thus be seen that early in development the *anlagen* of trachea and esophagus are surrounded by vascular rings consisting of paired aortae in front connected by vessels with paired aortae behind, the latter fusing into one descending aorta behind the heart. (Figure 1.)

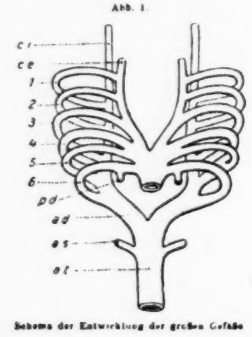

FIGURE 1 (from Arkin). Diagram of embryonic aortic arches and great vessels.

By the atrophy of most of the right dorsal aorta and the right sixth (pulmonary) arch, this vascular ring is interrupted and nothing remains to pass behind trachea and esophagus which might act as a counterpoint against which pressure from in front could exert constriction. (Figure 2.)

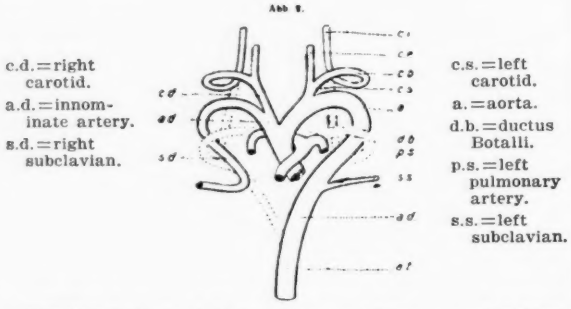

FIGURE 2 (from Arkin). Diagram of the normal definitive aorta and great vessels in man. Vessels disappearing shown in dotted lines.

The developmental defects which are responsible for clinically important symptoms from pressure arise mainly from one of two, abnormalities—(1) anomalous right subclavian artery, (2) persistence of the fourth right aortic arch as the definitive aorta (with or without partial persistence of the left fourth and sixth arches).

It is at first rather difficult to understand how an anomalous right subclavian artery could be responsible for obstructive symptoms from the esophagus until the development of the subclavians is recalled. These arteries start as segmental branches at the level of the point of fusion of the dorsal aortae. With the growth of the embryo and descent of the heart the subclavians ascend their respective unfused aortae. Normally as the right subclavian ascends, the aorta behind it extending back to the bifurcation atrophies and disappears. If, however, this atrophy takes place, not caudad, but cephalad to the right subclavian, the latter remains functionally attached to the definitive descending aorta distal to all the other branches of the aortic arch and behind the heart. To reach the right arm it must cross behind the trachea and esophagus and can, therefore, cause pressure on the back of the esophagus. (Figure 3.) This

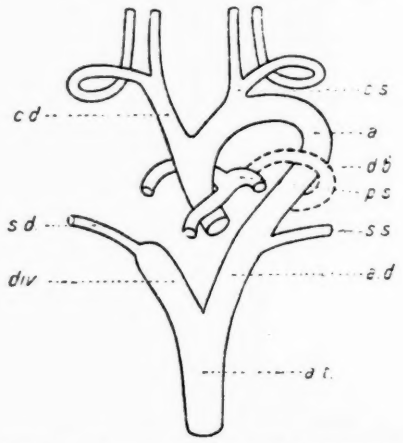

FIGURE 3 (from Arkin). Diagram of development of anomalous right subclavian artery as the last branch of the aortic arch passing behind trachea and esophagus.

anomaly is comparatively common. According to Priman some 260 cases have been reported but chiefly as dissecting room findings. He states that it occurs in 0.4-0.8 per cent of cadavers in anatomical laboratories. It very infrequently causes symptoms. (Rarely it passes between trachea and esophagus.)

The second abnormality, and the one of special interest in this report, is the persistence of the fourth right aortic root, in place of the left, as the chief or only exit of blood from the left heart. This condition in which the aorta arches over the right main bronchus instead of the left is normal in birds. In the cases of importance in man the aorta passes behind trachea and esophagus and may or may not be connected anteriorly with a persistent left fourth arch (double aorta—normal in reptiles), or a patent ductus arteriosus. (Figure 4.)

Further discussion of the possible variants

of the great vessel origin and of the associated cardiac defects can be omitted here since the literature was excellently reviewed by Blackford, Davenport, and Bayley[2] in 1932. They discovered about 100 cases of right aortic arch. In a personal communication to us Blackford has included further a case by Renander[3] (1926). This case is apparently the first diagnosed during life which has been reported in English although it appeared in the Scandinavian Acta Radiologica. Jenkinson[4] published in 1932 the report of another case diagnosed by x-ray examination. We are reporting two more whose symptoms required roentgen examination which

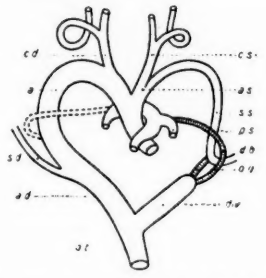

FIGURE 4. Diagram of case reported by Arkin of persistent right aortic arch with partial persistence on the left of the 4th aortic arch forming the subclavian, and the 6th aortic arch as the ductus botalli, completing a vascular ring about trachea and esophagus.

resulted in the diagnosis. Since our interest in this condition has been aroused, two other patients have been shown to have persistent right aortic arch after careful roentgen study. In these two, no symptoms of obstruction to the esophagus or trachea have been definitely present.

SYMPTOMS

In spite of the great number of cases in the anatomical literature it is important to call attention to the symptoms which may arise from constriction by a vascular ring in persistence of the right aortic root since very few of the reported cases have presented any symptoms whatsoever, or else they were complicated by grave cardiac defects responsible for early death. It has been largely an autopsy or dissecting room diagnosis.

While we have observed other complaints the one most characteristic is "dysphagia lusoria" (Latin lusor, a deceiver), a term first used in connection with an anomalous right subclavian artery by Bayford in 1789. As a diagnostic problem, therefore, these cases are to be found mainly among patients with difficulty in swallowing and rarely in breathing and an appreciation of the condition becomes of moment to the clinician, the surgeon, the laryngologist, the esophagoscopist, and the roentgenologist.

Death has resulted from constriction of esophagus and trachea. In Herringham's[5] case, similar in embryology at postmortem examination to that of Arkin[6], the patient died from gradual dilatation of the esophagus obstructing the trachea. The larynx was also paralyzed from pressure on the right recurrent laryngeal nerve which passed around the right aortic arch. The child dying at six months of age reported by Herrmann[7] had peculiar wheezing respiration, cyanosis and short cough like a dog's bark. She died of respiratory infection and a true double aorta was found at autopsy. (This represents a persistence of the reptilian type of aorta.) Herrmann mentions another case of an adult man with double aorta dying suddenly after a plastic operation for cancer of the lip. Saupe's[8] patient dying at 60 years of age of pulmonary tuberculosis had dysphagia thought to be due to dilatation of the abnormal aorta. Renander's patient, a man of 54, had a sensation of weight and pressure across the chest with piercing pains toward the arms and dysphagia, the symptoms being of only two years' duration. Jenkinson's patient, a woman of 31, had no symptoms referable to the aortic arch, nor did the patients reported by Arkin. The boy of 12 described by Blackford et al, had evidently other important cardiovascular anomalies with cyanosis, fainting, and aphonia. That uncomplicated right aortic arch does not of itself shorten life can be seen in the report of Pense's case[9] of a sailor who died at 78. Even a double aortic arch may not be important since Curnow's[10] patient, a woman, lived to the age of 87.

DIAGNOSIS

The diagnosis of the condition in which the aorta passes backward and behind the esophagus is necessarily largely dependent on the roentgen-ray although one of our cases was confirmed by esophagoscopic examination. The only other diagnostic point has been emphasized by Arkin, i.e., the position of maximum intensity of the aortic second sound at the right sternoclavicular joint instead of in the second interspace. Assmann[11] in 1918, was the first to make the diagnosis of right aortic arch during life by x-ray examination. Attention of the present authors was first attracted to the condition by the presence of one of them (H. B. S.) at the presentation of the cases by Arkin in 1927. It is from the published reports of these cases in German the previous year that the best description of the diagnostic x-ray data is to be secured. In his own case proved at autopsy, in addition to the right-sided aorta, a partial persistence of the left fourth arch was found arising from a diverticulum representing the left paired dorsal aorta as well as a fibrous ligamentum arteriosum. The patient, a man of 50, died of generalized periarteritis nodosa. Arkin called attention to six points in the roentgen-ray examination of this case.

1. A wide, sharply circumscribed shadow was found with a strong systolic pulsation to the right of the sternum, beginning in the fourth

intercostal space, extending backward to the left with a very small aortic knob on the left.

2. In the first oblique position the aortic knob was not seen in front of the trachea but behind.

3. Within this knob lay a round, thick, shadow, the remainder of the left dorsal aortic root.

4. The trachea appeared to be pushed forward at the top of the retrotracheal knob.

5. The esophagus was displaced to the left and anteriorly in a semi-circle with obvious pulsation of the aortic arch against the back of the esophagus.

6. In the left oblique position was seen a wide part of aorta to the right of the trachea and above the right bronchus.

In general, therefore, in the anteroposterior view the aortic knob is seen, if at all, higher than usual and to the right rather than to the left of the sternum. Barium in the esophagus shows the latter displaced to the left. In rotating the patient to the right anterior oblique view the ascending and descending portions of the aortic arch instead of superimposing become separated as is seen normally in the left oblique view. Study of the esophagus with barium shows the anterior displacement of it and the pulsation of the aorta behind it. Arkin was also able to demonstrate the shadow of the diverticulum remaining from the left aortic root.

Complicating cardiac anomalies may be present. Blackford et al, report these in five of the twelve cases diagnosed during life. This is a much greater incidence than in the series diagnosed at autopsy but, as they say, the obvious cardiac abnormalities resulted in more intensive study in the former group. Such complicating anomalies were evident in one of the four cases diagnosed by us, which would make six instances out of 18 cases diagnosed during life since there was no evidence of other anomaly in the cases of Renander and Jenkinson.

CASE REPORTS

CASE 1

D. D. The patient, a girl of 17, was first seen in the Outpatient Department of the Massachusetts General Hospital on October 21, 1930, with the complaint of discharging left ear for a week. She was treated and the discharge subsided. On June 20, 1931 she visited the Outpatient Department again complaining of nervousness, malaise, fatigue, abdominal pain and headache of two years' duration. For about this length of time she had also had difficulty and sometimes pain on swallowing solid food. She had noticed increased sweating, "hot flashes", and flushing of the face, upper chest and arms. She had lost five or six pounds in the previous six months in spite of having a good appetite. After eating, there was at times pain in the midepigastrium lasting a few minutes to a few hours. Some attention was paid to the fact that her father was being treated for peptic ulcer. On exertion there was sometimes palpitation and faintness. She admitted that she was subject to emotional excitement and was rather unhappy and worried.

The physical examination showed little of importance. There appeared to be slight widening of the palpebral fissures. The thyroid gland appeared to be slightly enlarged but there was no palpable mass. Examination of the chest and abdomen was negative. The heart was not enlarged. The sounds were clear. The rhythm was regular at a rate of 110 and there was a slight blowing systolic murmur in the third left interspace. It was noted that there was fine tremor of the extended fingers. A basal metabolism test was made which showed a rate of plus two per cent. In the Thyroid Clinic on June 20, 1931 she complained of throbbing in the neck, a feeling of a lump in the throat, hoarseness and difficulty in swallowing solid food. The record states, however, that she appeared to be of the calm introspective type. Examination of the larynx showed no pathology.

On June 10, 1931 she was admitted to the hospital for further examination. X-rays taken before admission to the hospital showed on barium examination of the esophagus that it filled well to the level of the fourth thoracic vertebra. At that point there was a definite constriction and a very thin line of barium passed through it for about three cm.; below this point the esophagus appeared normal. The finding was constant in all views. There was no dilatation about the constriction and no evidence of substernal thyroid enlargement. The heart shadow was not remarkable at that time and the diagnosis lay between carcinoma, esophageal diverticulum and esophageal web. The laboratory findings in the hospital were normal. An extensive examination by a psychiatrist resulted in a diagnosis of esophageal spasm due to anxiety hysteria.

It was felt that the symptoms were consistent with "globus hystericus". She was discharged from the hospital on August 29, with a diagnosis of questionable spasm of the esophagus or congenital stricture, or cold abscess of the spine pressing on the esophagus.

In September, 1931 further study by x-ray revealed the fact that the aorta passed backward to the right of the trachea and esophagus and then behind them causing displacement of them anteriorly and to the left. (Figure 5.) Pulsation of the arch of the aorta

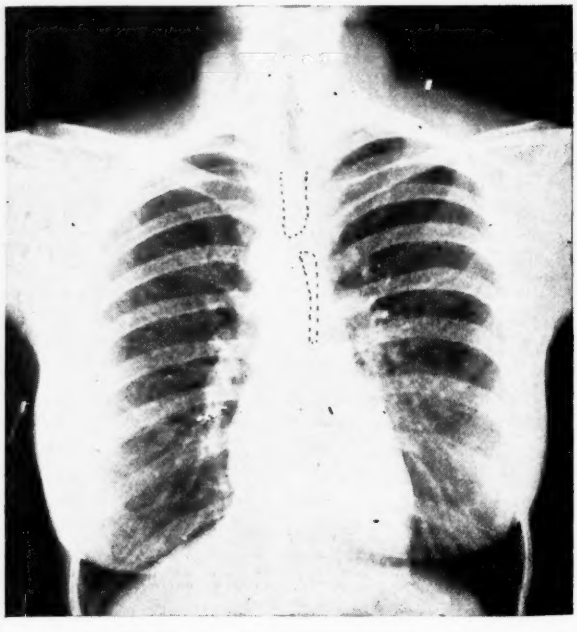

FIGURE 5. Case 1. (D. D.) Roentgenogram showing absent aortic arch on the left, present on the right and high in position. Barium in the esophagus may be seen obstructed at the level of the aortic arch. (Outlined in dots.)

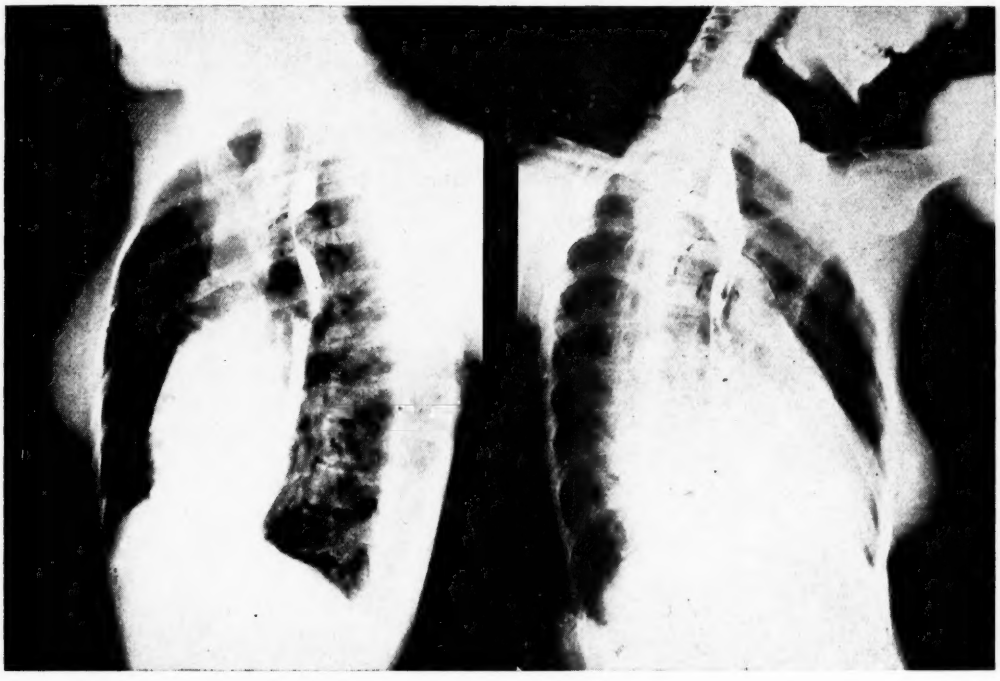

FIGURE 6. Case 1. (D. D.) Oblique roentgenograms showing barium in esophagus obstructed by aortic arch (dotted lines) passing behind it.

against the barium-filled esophagus could be clearly shown. (Figure 6.) At that time the symptoms were persisting and she had had periods of vomiting large amounts of liquid. It was further noted that the blood pressure in the right arm was 145 mm. systolic and 100 mm. diastolic. She was put on a high calory liquid diet. When last seen April 5, 1933 she was somewhat better. There was still considerable difficulty in swallowing solid food and she felt more comfortable living on her father's ulcer diet. However, she was holding her weight. Ingestion of food, particularly if followed by exertion, would cause pain to the left of the upper sternum and she was forced to induce vomiting for relief. Palpitation on exertion, headache, and dizziness still persisted with a feeling of heaviness in the left arm. Nothing new was shown on examination of the heart. The veins in the left side of the neck seemed to be somewhat more prominent than on the right.

Electrocardiogram taken on that day showed normal rhythm rate 105, flat T_2 and rather prominent P_2.

CASE 2

C. D. This patient was a woman of 33 years of age referred to one of us (C. H. E.) for a diagnosis of the cause of dysphagia and distress after eating which had been noticed for the last three years. This had been gradually increasing. A number of times undigested food had been expelled from the esophagus after vigorous exercise such as dancing. She had also noticed some numbness in the left arm and of the fourth and fifth fingers of the left hand with a vague pain radiating to the left side of the neck and tongue.

X-ray examination by the late Dr. L. B. Morrison showed a constriction of the esophagus at the level of the aortic arch and a marked delay in the passage of barium. (Figures 7, 8 and 9.) The esophagus also seemed to deviate anteriorly. The heart was in normal position. Esophagoscopy under ether

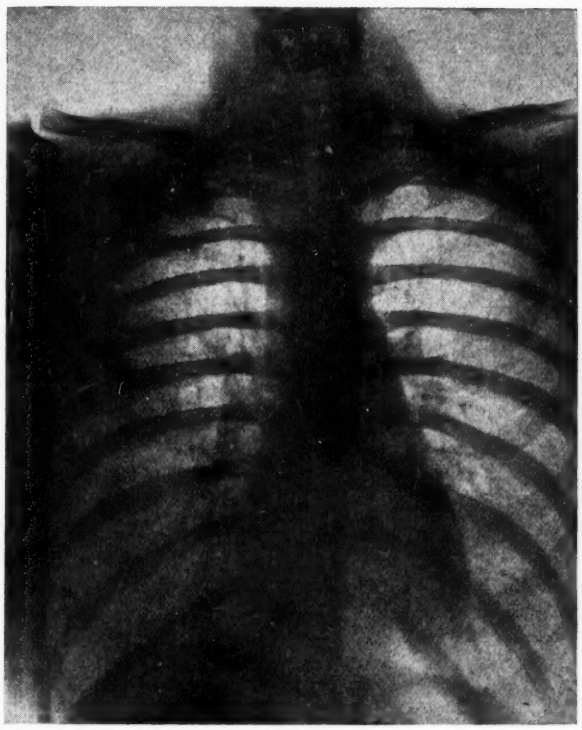

FIGURE 7. Case 2. (C. D.) Barium filled esophagus shown displaced to the left and narrowed by the right aortic arch.

was done September 14, 1932. A short esophagoscope was introduced just beyond the cricopharyngeus and the esophagus was distended by ballooning. A large pulsating mass was seen posteriorly and to the right. The lumen of the esophagus an-

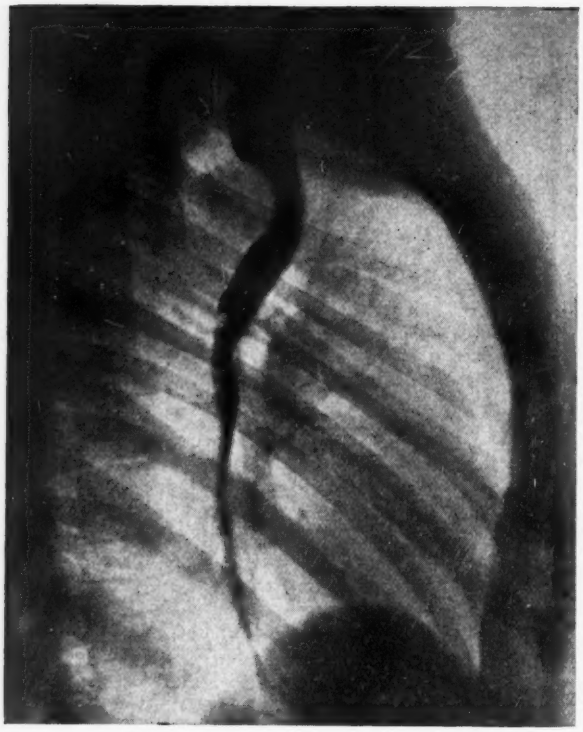

FIGURE 8. Oblique view of Case 2 showing aortic arch passing behind the barium filled esophagus and displacing it forward.

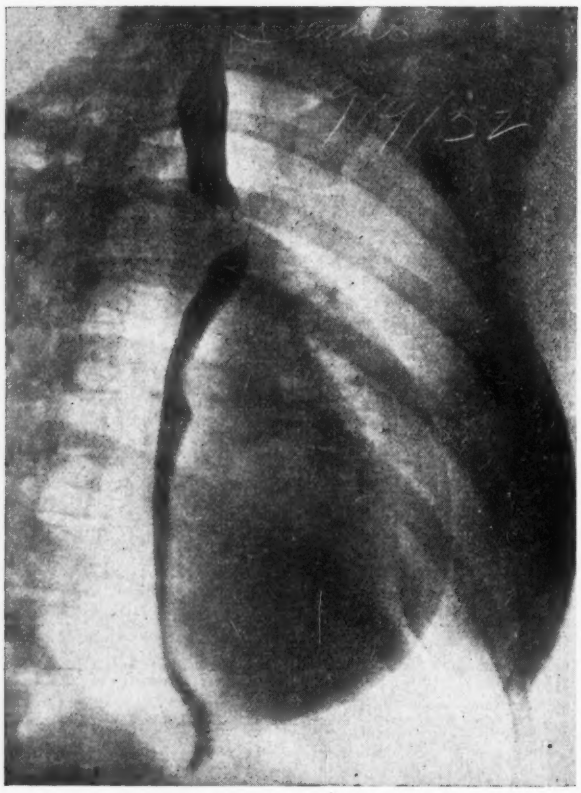

FIGURE 9. Oblique view of Case 2, showing definite obstruction to the flow of barium down the esophagus by the esophagus passing behind it.

terior to the mass was slitlike. There was moderate dilatation above the constriction with considerable redness of the mucosa. No attempt was made to introduce the instrument any farther. (Figure 10.)

The diagnosis was then made of persistent right aortic arch with possibly some vascular anomaly such as a remnant of the fourth or sixth left aortic arch causing constriction of the esophagus. The patient was last seen on March 30, 1933 and reported that there was no change except a little more difficulty in swallowing.

DIFFERENTIAL DIAGNOSIS

The presentation in detail of the symptoms of these two patients is intended to attract attention to the clinical picture of *dysphagia lusoria* and of other complaints dependent upon persistence of the right aortic root. It is probable that in such cases complicating anomalous vascular structures exist in the region of the arch resulting in a vascular ring about the trachea and esophagus. As a cause of difficulty in swallowing or breathing as well as of other symptoms such as dyspnea, cyanosis, stridor, hoarseness, cough, pain in the upper chest, vomiting, palpitation and indefinite sensations in the arms, the possibility of this condition should be kept in mind. In the differential diagnosis of such cases there appear to have been questions of intrinsic esophageal or tracheal pathology or spasm, *globus hystericus*, thyroid, thymic, and other mediastinal tumors, aneurysm, angina pectoris and cold abscess of the spine. Anomalies of the aortic arch must, therefore, be considered in thyroid surgery, esophagoscopy, bronchoscopy, and in suspected hysteria. Complete study of the heart and aorta by roentgenray should include visualization of the esophagus with barium. Proper recognition of the condition will preclude the necessity of esophagoscopy or bronchoscopy.

The other condition responsible for *dysphagia lusoria*, anomalous origin of the right subclavian artery may be confusing in the diagnosis. In the three cases of dysphagia from this cause reported from the literature by Goldbloom[12] there was found an aneurysm at the origin of the artery in each instance. One died of inability to swallow, one of slow starvation and one of "simple dysphagia". One case has been described in which the anomalous artery eroded the vertebrae, another in which sudden death occurred from rupture of the artery when the patient swallowed a large mouthful of food and another from penetration of the anomalous artery by a swallowed bone. The patient reported by Kellock and Batten[13], a boy of two years and ten months of age, choked severely when eating an apple. Choking recurred seven months later from eating a sausage and death followed after severe dyspnea and cyanosis.

Arkin summarized the possible complicating conditions which may cause pressure on the

esophagus in the presence of right-sided aorta as follows:

1. A diverticulum representing a remnant of the left dorsal aorta.
2. A left subclavian artery as the last branch of the aorta.
3. A ductus botalli running behind the esophagus to reach the right-sided aorta.
4. The right aortic arch running behind and then to the left of the esophagus.

TREATMENT

Patients who are having no symptoms from an anomalous aortic arch are not in need of treatment, but it is of interest to note that symptoms apparently may develop considerably later in life than one might expect from the influence of a congenital anomaly. In the two patients that we report one reached the age of 15 years before the dysphagia became important and one was 30 years old.

Changes in the aorta due to infection or old age such as aneurysm or tortuosity of the vessel may result in much postponed symptoms and therefore the condition may represent a potential danger for later life in those free from distress at the time of observation. Fortunately most cases have no symptoms and very few have been seriously disabled or have died from the constriction.

So far as we know there has never been any surgical approaeh to the relief of the pressure symptoms, but it presents intriguing theoretical possibilities. Dr. Maude Abbott has emphasized this and she has drawn our attention to a case reported by Jex-Blake[14] of a dog that had to be killed because of increasing symptoms from constriction of trachea and esophagus in which it appeared that a cure could have been expected from surgery. Specifically the hope in such cases would be to find an obliterated ductus arteriosus or remnant of the left fourth arch which could be divided or removed to allow more anterior or lateral mobility of the esophagus and trachea even though the aortic arch continued to exert pressure from behind. The surgical approach to the region of the ductus is not unusually difficult and exploration in cases with increasing dyspnea or dysphagia would appear justified.

As palliative treatment liquid or soft diet of high calory value in small frequent meals and avoidance of exertion after eating have been helpful in our cases.

SUMMARY

Two cases are reported of *dysphagia lusoria* resulting from persistence of the right fourth aortic root as the first part of the definitive aorta passing behind the trachea and esophagus. This anomaly was unassociated with other demonstrable cardiovascular abnormalities. The symptoms began in otherwise healthy women at the ages of 15 and 30. The importance of a knowledge of this condition in the differential diagnosis of dysphagia as well as of some other symptoms is stressed. The suggestion is advanced that surgical relief should be attempted in cases with progressive disabling symptoms, in the hope of finding an obliterated ductus arteriosus or remnant of the fourth left aortic arch which could be divided to release pressure on trachea or esophagus.

We have seen two other patients with right aortic arch diagnosed by x-ray, one as an additional anomaly occurring with other congenital cardiac defects, but in neither instance were there any symptoms of interference with swallowing or breathing.

FIGURE 10. Photograph of colored drawing by C. H. E. showing the esophagoscopic view of the narrowed lumen of the esophagus in Case 2, with a pulsating mass posterior to it.

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CARCINOMA OF THE STOMACH IN A GIRL AGED NINETEEN*

BY GEORGE LEVENE, M.D.,† AND FRANK E. WHEATLEY, M.D.†

THE following case is distinguished by three features of interest:

First, carcinoma of the stomach is comparatively uncommon at the age of this patient.

Secondly, the degree of invasion is the most extensive to have ever come within our experience.

Thirdly, for five months prior to admission to the hospital, the patient had been under the care of her physicians for the treatment of "a nervous breakdown".

A girl of nineteen was admitted to the medical service of the Massachusetts Memorial Hospitals complaining of anorexia, vomiting, loss of weight and general weakness. Her family history and past personal history were not remarkable.

The present illness began five months previous to admission, when as a student in high school, she began to experience sleeplessness, anorexia and loss of weight. Her physician diagnosed the case as "a nervous breakdown," induced by overstudy, and the patient was enjoined from further study.

However, the symptoms not only persisted, but continued to grow steadily and progressively worse.

On admission to the hospital the patient weighed about seventy-five pounds and was too weak to sit up in bed. All food was immediately vomited. There was a productive cough with occasional blood-tinged sputum. Her temperature was 99.5°, pulse 125 and respirations 32.

A mass, tender on palpation, was definable in the epigastrium. Small nodular masses were palpable in the right lower quadrant. A tentative diagnosis was made of generalized tuberculosis.

Sputum examination was negative. X-ray of the chest was likewise negative and could in no way account for the patient's general condition.

Gastro-intestinal studies revealed a delay at the cardia with irregularity of contour and absent peristalsis of the distal end of the esophagus.

The stomach was remarkably small, having the capacity of about half an ounce. Peristalsis was entirely absent, the stomach being invaded from the pyloric sphincter to the fundus, except for a small island of tissue in the media. Barium passed immediately from the stomach to the small intestine, but the former was filled to its capacity by a residue at five hours.

The appendix was fixed and tender. The colon was tender, not freely movable, but not invaded. X-ray diagnosis was gastric new growth.

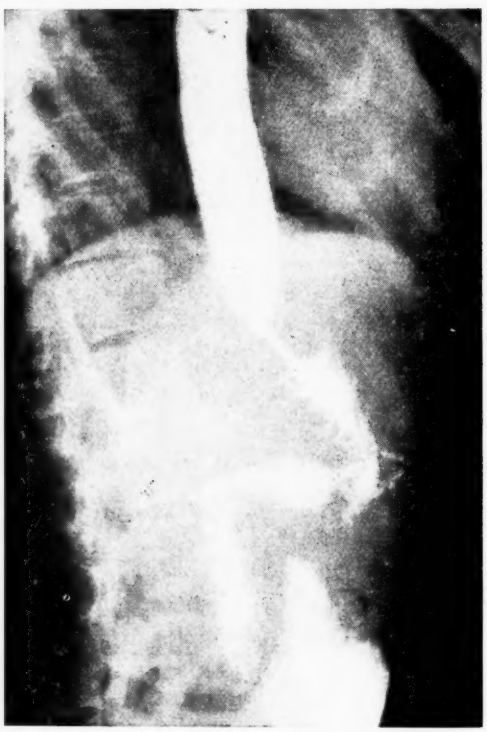

FIGURE 1.

The patient was transferred to the surgical service of Dr. J. Emmons Briggs, who performed an exploratory celiotomy.

At operation the x-ray appearance was substantiated; the stomach was small, much contracted along the lesser curvature and the pyloric one half and there was invasion of the liver, mesentery, intestine and parietal peritoneum. A tube was inserted into the jejunum for the purpose of feeding. Biopsy was done and the pathologist reported adenocarcinoma.

The patient became progressively worse and died two weeks after operation.

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FRACTURES OF THE SCAPHOID IN ATHLETES*

BY FREDERICK S. HOPKINS, M.D.†

FRACTURES of the carpal scaphoid or navicular constitute a unique and interesting group. Although the subject has been frequently discussed by various authors especially in the foreign journals and has been thoroughly reviewed in a monograph by Kellogg Speed[1], there are still certain features that warrant further consideration. This is especially true of its occurrence in athletes.

Our knowledge of fractures of the scaphoid may be said to start from the first general use of the x-ray, for they were rarely recognized previously. Even now most cases remain undiagnosed for a long time after injury, since the early symptoms are so slight that the condition is usually considered to be a simple sprain.

The incidence of these fractures varies greatly in various reported series. In 1921 Todd[2] reported only nine cases in three thousand admissions to a fracture outpatient department, while in 1933 Snodgrass[3] found one hundred and twenty-five cases in fourteen hundred and twenty-six fractures of the wrist, hand, and fingers not including the radius or ulna. The highest incidence is that of Bonnet and Sarroste[4] who had sixteen cases to only five fractures of the lower end of the radius. Although other authors have mentioned the comparative frequency of scaphoid fractures in young adults and athletes, they consider this predominance so great that they have named it "fracture du gymnaste". The scaphoid is fractured much more frequently than any other of the carpal bones and is often accompanied by injury to other bones of the wrist or hand.

The usual mechanism is similar to that causing a Colles' fracture, viz., a fall on the extended hand usually with radial flexion, the force being transmitted through the third metacarpal to the os magnum (capitate) which compresses the narrow portion of the scaphoid against the radius. The tubercle may be avulsed by forced ulnar flexion, and the mid portion may also be fractured by extreme ulnar or radial flexion.

Fracture of the tuberosity is rare and invariably results in bony union. The common site of fracture is through the mid portion of the bone and here bony union is generally considered to be very rare even with the best of treatment. This is due to the fact that the blood supply is seriously and permanently impaired by rupture of the important vessels. The bone is then said to degenerate especially in its distal portion, cavities are formed, and the whole bone may die, becoming merely a foreign body. This is especially true in those cases which are originally treated as sprains and these constitute the majority. The experience of Bonnet and Sarroste[4], however, tends to refute this general opinion, for they obtained bony union in nearly half of their cases, these being the ones with incomplete or impacted fractures.

Definite diagnosis is usually made by x-ray examination. The most important sign is localized tenderness over the scaphoid in the anatomical snuffbox between the extensor tendons of the thumb. Swelling may be distinct in this location. Motions of the wrist especially extension and abduction are limited and painful and the hand grip is weak. The most striking test is pain elicited by having the patient place his palm on a flat table and then lean on it with the wrist extended. With the wrist in radial deviation, sharp percussion on the third metacarpal causes pain in the fractured scaphoid. Crepitus may occasionally be felt.

There is a general agreement that a case seen within one week should be treated by immobilization, though there is considerable difference of opinion both as to the length of time and the ideal position. Some of the European authors advocate a period of about ten days, whereas most American surgeons prefer a much longer time varying up to twelve weeks but usually five to eight weeks.

Speed[1] advises slight volar and radial flexion or a position midway between flexion and extension. Wilson and Cochrane[5] suggest dorsiflexion with the fingers immobilized in the position of grasp for three weeks followed by a short splint for four weeks. After a thorough anatomical study Berlin[6] has given convincing evidence that the ideal position is forty-five degrees extension with slight radial deviation. For cases of more than one week's duration most authors agree with Speed in advising operative removal of the entire bone, although some prefer to excise only one of the fragments, usually the proximal.

The results of the non-operative treatment in old fractures are generally considered to be so poor that the individual is unable to do any strenuous work with the hand. In a case over one week old many surgeons believe that the result will be unsatisfactory if the bone is not removed promptiy. This they believe is due to arthritis and periarthritis that will persist even after late excision of the bone. With either prompt immobilization or excision, a useful wrist is usually obtained although bony union is rare.

This report is based on a series of cases in male students at the International Y. M. C. A.

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College where men are trained to be physical directors. The minimum required period of athletic work is two hours a day throughout the four-year course, and many of the men are engaged in strenuous exercise for much longer periods. One case of the wife of a student is included because she is also an athlete and reported her result by the ease with which she could do hand stands.

The incidence of fractures of the carpal scaphoid in this group is remarkably high. During the period from 1922 to 1933 there were twenty-three cases in an annual student population of approximately five hundred. The total number of all fractures listed during the same period including finger, toe, and nose was only one hundred and seventeen. There were only two Colles' fractures. During the same period in my private cases there were three fractures of the scaphoid and nineteen Colles' fractures. There was no instance of multiple fractures, and in only one was there an accompanying dislocation of the semilunar. The ages ranged from eighteen to twenty-six years. The right and left wrists were involved in an approximately equal number of instances.

I have no satisfactory explanation as to why the scaphoid should be so frequently fractured in athletes while Colles' fractures are comparatively rare. Bonnet and Sarroste[4] in discussing the tendency of the scaphoid and semilunar to osteodystrophy suggest that there is a local disturbance of the calcium metabolism due to (1) traumatic or septic vascular obliteration, (2) local reflex disturbance of the sympathetic system due to the pain of trauma and causing impairment of the circulation, and (3) a functional defect of the endocrines especially the parathyroids. Meyer[7] has discussed the evidence of attrition in the human body and has shown that cartilage, walls of synovial bursae, articular capsules, menisci, and even tendons in contact with bone are actually worn away by use. Jansen[8] has contributed some pertinent observations on the effect of use on the growth and strength of bones. He calls attention to the Hueter-Volkmann theory that growth is retarded when pressure exceeds the normal and is accelerated when pressure is diminished. Later Wolff opposed this theory but offered proof that the elements of the cancellous tissue modify their width and their direction when the intensity and the direction of pressure stresses are modified. It has been demonstrated that the dense bone of a vertebra on the concave side of a lateral curvature contains a higher percentage of inorganic salts than on the rarefied side. Jansen then concludes that with an excess of pressure the absorption of lime salts exceeds the absorption of colloid substance and thus that a condition of plasticity of the bone substance develops to an excess of pressure. He reports malacia of the carpal semilunar and variation in the size of the carpal scaphoid and semilunar of the right and left hands as demonstrating the effect of pressure. This he considers to be evidence of plasticity through excessive weight-bearing. When fracture occurs in such a bone a vicious circle develops in that plasticity through fracture develops on top of plasticity through excessive weight-bearing. It has long been known that lack of use leads to absorption of lime salts.

This group of cases does not offer any important evidence to substantiate any of these theories. There may be some factor comparable to that causing Kienboch's or Preiser's disease, yet there was no x-ray evidence of abnormal bone in any recent case. Even in the old cases there was only one instance of death of the distal fragment. This tends to refute the theory of previous impairment of circulation either by traumatic or septic vascular obliteration or by reflex disturbance of the sympathetic nervous system. Why a functional defect of the endocrines should render one bone more liable to fracture is beyond explanation. Excessive cartilage wear may have some influence. The amount of pressure on a bone has been shown to alter its chemical composition. However, the only conclusion that I feel can be safely drawn is that the degree of use has a definite influence on the composition of bone and that any individual bone is made more liable to fracture either by insufficient or excessive use.

The type of accident causing the fractures was most frequently a fall on the hand as in all other published series. Of these falls eight were in gymnasium work usually from apparatus, five were on the football field, and six were varied. Of these one was by twisting his wrist over another man's shoulder in a carrying through shot in lacrosse, probably extreme ulnar flexion; one was using the dorsiflexed hand against another man while on the defense in football; one was catching a medicine ball; and one was a blow in boxing. In the private cases there was one fracture by a direct blow with a stick.

According to the literature the distal fragment usually dies and acquires increased density by x-ray especially if not promptly immobilized. However, in this group there was only one case with x-ray evidence of death of the distal fragment. In one where immediate removal of the proximal fragment was done the distal fragment retained a normal appearance. In the others there were normal bone markings throughout both fragments except for local absorption at the fracture line. Follow-up pictures were obtained in two cases after six months, eight cases after one year, one case after four years, and two cases after five years.

The conspicuous feature of the symptomatology was the mildness of the initial discomfort. Although medical service is constantly available at the college without charge, the majority of the men did not report to the infirmary promptly because they considered the condition a trifling sprain. One did call because of a bruise of his thenar eminence but did not mention his wrist, and it was not examined. Ten weeks later he stated that his wrist had been aching ever since he had bruised the base of his thumb, and x-ray then showed a fracture of the scaphoid.

Even x-ray examination may be deceiving, for there were four cases where the picture taken immediately after the injury was reported as negative, yet where subsequent x-ray showed a definite fracture. In two of these, careful reëxamination of the original films revealed a very faint line that had been overlooked in spite of excellent pictures, but in the others no suggestion of fracture could be detected even with the aid of hindsight.

Various modifications of treatment were used, but all cases that were diagnosed within one month were immobilized from five to eight weeks. The methods used were moulded plaster, plaster cast, or anterior and posterior wooden splints. With the first two methods the hand was placed in slight dorsiflexion usually with a little radial deviation and with the thumb immobilized. Of the cases with negative initial x-ray findings, three were immobilized for periods of about two weeks and one was immobilized for eight weeks. Three cases were treated by operation, two by removal of the proximal fragment and one by removal of the entire scaphoid. One of these was done on a fresh case because of marked displacement accompanied by dislocation of the semilunar. Seven cases, all of them late, received no treatment.

In some of the cases a little guarded active motion was started one or two weeks before omitting the splints. In all cases active motion was encouraged at the end of immobilization, and most of them had some form of physiotherapy. This has included baking, massage, diathermy and whirlpool baths. This appears helpful, although the one important feature in after-care is active use. The added time required for full active use was from none to seven weeks. It is interesting to contrast this with the disability in industrial accident cases where Kessler[9] reports the average temporary disability of three to six months and the permanent disability as twenty to twenty-five per cent of the hand.

End results after varying intervals up to eleven years have been obtained in all but one case. The most surprising feature of the results is the fact that every individual including those with no treatment has been able to continue active strenuous work as a physical director. Accordingly, the economic result has been invariably good. Inasmuch as there has been no displacement of the fragments except in the operative cases, the anatomical result has also been good. The functional results were grouped as follows: (1) perfect, i.e., functionally as good as ever, (2) good, i.e., able to do everything but having slight discomfort on forced motion or slight limitation of motion, (3) fair, i.e., sufficient limitation of motion or enough pain to interfere with work, and (4) poor, i.e., marked limitation of motion or marked pain. Including all the twenty-two cases with known results there were four or 18.2% perfect results, thirteen or 59.1% good results, and five or 22.7% fair results.

The four perfect results were all cases immobilized promptly, two dorsiflexed in moulded plaster for six and eight weeks, and two in straight anterior and posterior wooden splints for five weeks. All the other cases treated promptly had good or group two results, typical comments being "slight discomfort on forced extension as in parallel bar work"; or "pain on sustained hand stand, bothers in wand twisting exercises".

Three cases that had immediate negative x-rays were immobilized for two weeks. The end result on one is not known except that he is working as a physical director. The next was rated as fair or group three, although he reports that he can do a hand stand on the parallel bars but not on the floor. There is local tenderness and only fifty per cent of normal dorsiflexion. The other case in this group had the proximal fragment removed and is rated as group two. The remaining case with an immediate negative x-ray was reëxamined in three weeks and immobilization continued for an added period of five weeks. He is included in group two and is able to place his full weight on the hand without pain. I would suggest that every case with tenderness over the scaphoid be immobilized for two weeks even if the x-ray is negative and at the end of that time a second x-ray examination be made.

Of the late cases three were seen after three weeks and were immobilized. Two of these were classed as group two with comments as follows: "wrist does not bother at all except that it tires more easily", and "can do everything but have discomfort on apparatus work or hand stands." The latter shows bony union. The other case is placed in group three because of limited motion, pain on apparatus work and inability to do hand stand. Seven late cases received no significant treatment, yet four of these are rated as group two with good results. One was later on the varsity gymnasium team for three years and another on the varsity football team. Typical comments are "discomfort, but able to

do everything''; ''can pole vault but can't put the shot.'' Three untreated cases are classed as fair or group three. The comments are as follows: ''I have to favor the wrist. Since giving up active participation in games, have not suffered great inconvenience.'' ''Injured same wrist again nine years later and was immobilized six weeks. Can use it but it is bothersome.'' ''I am worried as to whether I can continue (6 years later) because of pain and difficulty in apparatus work. There is swelling over the scaphoid, and I have had gradually increasing disability.'' None of these last three cases have had recent x-ray examinations.

The three operative cases would all be classed in the lower section of group two, viz., with good results though having some limitation of motion and some discomfort on strenuous use. The best surgical result was after removal of the entire bone. Three other cases were advised to have operations but refused.

The remarkable features of this series of twenty-three college athletes are as follows: (1) The carpal scaphoid was fractured more frequently than any other bone in the body even including the phalanges. (2) Excessive use apparently renders the scaphoid more liable to fracture. The theories offered in explanation of this are injury to the blood supply, sympathetic reflex disturbance of the local circulation, mechanical wear, and physiological bone plasticity stimulated by strenuous use. No one of these theories is entirely satisfactory. (3) The initial symptoms are frequently so slight that medical advice is not sought until after a period of weeks. (4) In four cases the immediate x-ray examination was reported as negative, and the definite diagnosis was made only after pictures taken later showed the fracture. In only two of these, later reëxamination of the original films showed a very faint suggestion of a fracture line. It is advised that all cases with tenderness over the scaphoid be immobilized for at least two weeks and then re-rayed even though the first x-ray is negative. (5) Although it has been generally taught that death of at least the distal fragment is very common, it was noted but once in this series. (6) When union occurs it is usually with fibrous tissue, yet in at least two instances there was bony union, both cases being complete fractures of the midportion and one of these was not immobilized until over three weeks after injury. (7) Four untreated cases obtained good results. (8) All the cases including the neglected ones secured such satisfactory results that they are working actively as physical directors.

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HUMAN AND BOVINE INFECTION IN EXTRAPULMONARY TUBERCULOSIS

BY C. S. CHANG, M.D.*

INTRODUCTION

1. The object of this paper is to present the percentage of extrapulmonary tuberculosis cases at the Lakeville State Sanatorium that are infected with human and bovine tubercle bacilli respectively. These figures should be helpful in determining the source of infection, and to a certain extent they should give an idea of how much tuberculosis could be eliminated by universal pasteurization of milk as well as the enforcement of rigid elimination of tuberculous cows.

2. Two hundred cases of proved tuberculosis, other than that of the lung, were available for study. This group should naturally form merely a preliminary analysis as the number of cases should increase from year to year, and a very large group should ultimately result.

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HISTORY AND METHOD

Following the discovery of the tubercle bacillus by Robert Koch in 1882, Theobald Smith, in 1898, noted differences in certain tubercle bacilli which he called human and bovine characteristics. Other than differences in morphology, he noted that one strain of tubercle bacilli would increase the acidity of a standardized medium, whereas the other type would diminish the acidity. He also found that one strain would cause rapid and extensive tuberculosis in a very short time when injected into a rabbit, whereas the other was much slower and much less fatal in its result.

More recently, Petroff, at Saranac Lake, has

shown, however, that a transmutation of bovine tubercle bacilli to human tubercle bacilli can be made to take place. Just what part this plays in an analysis of this sort should be carefully considered.

The method of procedure in these cases was as follows:

1. From each case a sample of pus or broken-down tissue or specimen such as a gland was obtained, and the material emulsified and injected into guinea pigs. Only cases showing positive tuberculosis, at autopsy of the guinea pigs, were used.

2. In those cases in which the guinea pig showed tuberculosis at autopsy, tubercles were taken from the spleen and cultures made. Smith's acid reaction test was then performed and rabbits were injected with the bacilli.

3. The result was first, a positive bacteriological proof that the lesion in question was tuberculosis, and, secondly, whether it was bovine or human infection.

Table 3 summarizes table 2, and brings out the fact that in this series bovine tuberculosis is much more common in the first years of

TABLE 1

Table showing the relative percentage of human and bovine types of infection was as follows:

	Bovine		Human	
	No. of cases	Per cent	No. of cases	Per cent
Lymphoid gland tuberculosis				
children 1 to 5 yrs.	4	50%	1	7.7%
" 6 to 10 "	2	25%	1	7.7%
" 11 to 16 "	1	12.5%	1	7.6%
adults 17 yrs. and over	1	12.5%	10	77%
Bone-joint tuberculosis				
children 1 to 5 yrs.	13	31.6%	6	6.5%
" 6 to 10 "	10	24.4%	9	9.7%
" 11 to 16 "	9	22%	18	19.3%
adults 17 yrs. and over	9	22%	60	64.5%
Miscellaneous forms of tuberculosis				
children 1 to 5 yrs.	0	00.0%	0	00.0%
" 6 to 10 "	2	33.3%	1	2.6%
" 11 to 16 "	1	16.7%	2	5.1%
adults 17 yrs. and over	3	50%	36	92.3%

TABLE 2

ANALYSIS OF CASES

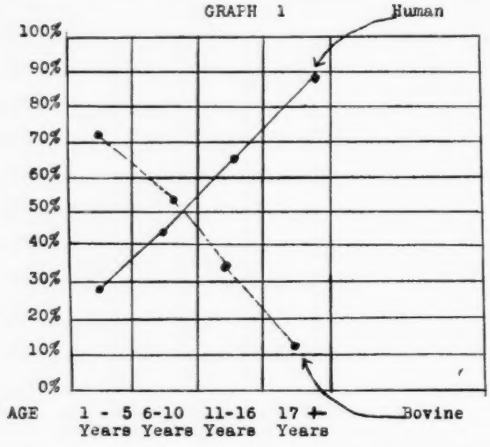
The following table lists the cases in age groups whether or not they are human or bovine:

Tuberculosis of	Children 1-5 yrs.		Children 6-10 yrs.		Children 11-16 yrs.		Adults 17 yrs. over		Total Cases
	H	B	H	B	H	B	H	B	
Hip	—	—	2	4	10	2	23	4	45
Sacro-iliac	—	—	—	—	—	1	5	2	8
Gland	1	4	1	2	1	1	10	1	21
Ankle	1	3	1	—	1	—	2	—	8
Chest-sinus	—	—	—	—	—	—	2	—	2
Testicle	—	—	—	—	1	—	3	—	4
Wrist	1	—	1	—	—	2	3	—	7
Ear	—	—	—	—	—	—	1	—	1
Foot	1	2	—	—	—	—	4	1	8
Knee	1	1	—	1	6	2	6	—	17
Intestine	—	—	—	—	—	1	2	—	3
Kidney	—	—	—	—	—	—	17	—	17
Tonsil	—	—	—	—	1	—	—	—	1
Abdomen	—	—	—	1	—	—	4	1	6
Elbow	—	—	—	1	—	—	1	—	2
Dactylitis	2	5	1	—	—	—	1	—	9
Meningitis	—	—	—	1	—	—	2	2	5
Epididymitis	—	—	—	—	—	—	1	—	1
Laryngitis	—	—	—	—	—	—	2	—	2
Empyema	—	—	1	—	—	—	1	—	2
Arm	—	—	—	1	—	—	—	—	1
Mastoid	—	1	—	—	—	—	—	—	1
Spine	—	1	4	3	1	2	15	2	28
Cervix	—	—	—	—	—	—	1	—	1
Total	7	17	11	14	21	11	106	13	200

life than in later years, and conversely the percentage of human infections rises with age. The table is exemplified by graph 1. The percentage of 71 per cent in the first 5 years of life drops to 11 per cent in the group over 17 years of age. It is interesting to speculate as to what per cent of those listed as human infections at the age of 17 years or more were originally bovine infections which have assumed the characteristics of human tubercle bacilli after being in the human host for a number of years.

TABLE 3

	Cases	Human	Per cent	Bovine	Per cent
1 to 5 yrs.	24	7	29%	17	71%
6 to 10 yrs.	25	11	44%	14	56%
11 to 16 yrs.	32	21	65.6%	11	34.4%
17 yrs. and over	119	106	89%	13	11%
Total number of cases studied	200	145	72.5%	55	27.5%



These figures would seem to call attention again to the problem of milk, as milk is such an important dietary feature of children under five years of age. We investigated the source of milk in these cases and found that most of these children were obtaining milk in communities where milk was not being pasteurized, and where herds were not being tested for tuberculosis. It was the old question of obtaining milk in its raw state from a neighboring farm. It would seem, therefore, that a high percentage of bovine tuberculosis in children could be eliminated in two ways. First, by further enforcement of tuberculin-testing of all herds of cattle. Secondly, by adding the safeguard of universal pasteurization. There are, of course, some objections to pasteurization, but it would seem that these are minor in contrast to the ravages of tuberculosis.

Education of the public to the differences between pasteurized and unpasteurized milk might gradually lead to such a demand that pasteurization would become a necessity for the dealer in milk.

By going over table 2, it will be seen that tuberculosis of the hip predominates in frequency in both the adults and the children, making up 45 or 24 per cent of the 200 cases. Tuberculosis of the spine was next in frequency, making up 14 per cent of the total number of cases, with tuberculosis of the glands ranking next with 21 cases.

SUMMARY

1. Two hundred cases of extrapulmonary tuberculosis were studied, and the conservative organism determined.

2. Of these 200 cases, 145 or 72.5 per cent were infected with the human tubercle bacilli, and 55 or 27.5 per cent were infected with the bovine tubercle bacilli.

3. Cases under five years of age show an incidence of 71 per cent bovine, whereas over 17 years of age the percentage dropped to 11 per cent.

4. We feel that the high percentage of bovine tuberculosis reëmphasizes the importance of eliminating tuberculosis at its source. The milk supply is still a problem, as the investigation shows.

5. A universal tuberculin-testing of herds and universal pasteurization of milk would seem justified.

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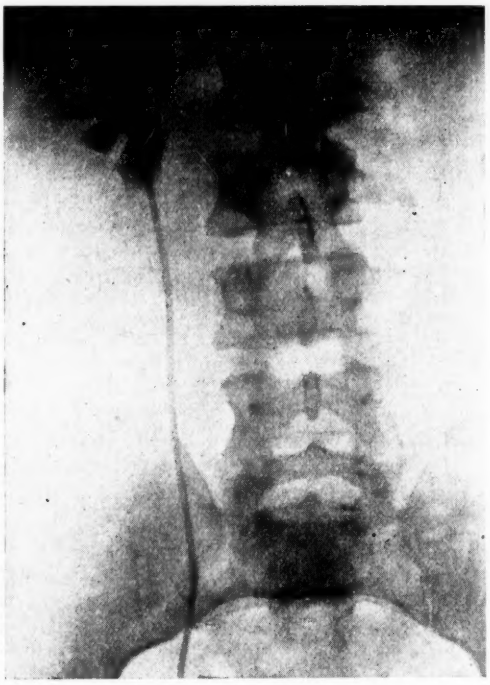
The author desires to thank Dr. Leon A. Alley, Superintendent of Lakeville Sanatorium, Dr. George H. Bigelow, Commissioner of Public Health, and Dr. Z. B. Adams, Surgeon to Lakeville, whose kind help and suggestions have made this work possible.

TRAUMATIC RUPTURE OF THE KIDNEY*

BY DONALD S. ADAMS, M.D.,† AND BANCROFT C. WHEELER, M.D.†

THE following cases of ruptured kidney were admitted to the surgical service of Memorial Hospital during the year 1932. They presented certain features of sufficient interest, we believed, to merit reporting.

CASE No. 1. C. P. Male, aged 38, machinist. About noon on the eleventh of November, 1932, he was struck in the right flank by a heavy piece of wood which he was holding as a brace. There was noted severe pain both in the back and right abdomen. He was seen and examined within an hour. At that time the pulse was 90, good quality, blood pressure —systolic 118, diastolic 90. The general appearance did not indicate severe injury. Moderate spasm of abdominal and lumbar muscles existed and he was sent to the hospital for observation. Two hours



CASE 1.

after admission the blood pressure dropped rapidly and profound shock developed. A palpable mass in the kidney region appeared, hematuria was marked and the patient was transferred to the operating room.

The presence of six suitable donors enabled the transfer of three liters of fresh warm blood before, during and after operation. But even after the hemorrhage was controlled the blood made little noticeable impression. The operation consisted of the usual loin incision and exposure of the fractured kidney. The lower pole of the organ together with kidney substance, measuring 70 by 45 by 30 mm. was found separated spontaneously and removed. The hemorrhage, which was brisk, was partially controlled by suture ligatures and a large gauze pack was placed firmly against the remaining points of bleeding. The wound was sutured rapidly above and below it.

He was returned to his room in poor condition, but rallied and made an uneventful recovery. The pack came out a little at a time being removed entirely on the sixth day. On the fifty-eighth day of convalescence with urinary drainage through the flank at its maximum, a cystoscopy revealed the presence of a functioning right renal remnant. The impression was gained that a communication between the pelvis and ureter existed. Ten days later another cystoscopy was done and pelvis injected. The pyelogram showed the tip of the catheter to lie well in the pelvis. The latter appeared nearly normal only the lowest calyx being absent. The patient was discharged on his seventy-first hospital day with moderate urinary fistula which entirely dried up within a month. Two months after discharge he was able to resume his former work.

CASE No. 2. P. P. D., a boy of 12, was brought to the hospital March 24, 1932. Half an hour previously he had fallen from a second story veranda and struck the right side of his abdomen on a fence. He walked a short distance home and was immediately taken to the hospital. On admission he was apparently in acute distress. The temperature was 97, pulse 100, respirations 30, blood pressure 96 over 52. Examination revealed no contusions but the abdomen was spastic throughout, more so on the right. There was moderate distention and marked tenderness over the right upper abdomen and loin. The urine was grossly bloody. A white count of 24,000 with 84 per cent of polymorphonuclears was found.

At the end of three hours the pulse was 110 and the abdominal pain and tenderness were increased. It was decided to operate through the abdomen, in view of the preponderance of abdominal symptoms. The pre-operative diagnosis was rupture of the right kidney with possible injury to the liver. The abdomen was opened through a right rectus incision and a moderate amount of bright red blood, with some clots, was found in the peritoneal cavity. There was a massive retroperitoneal hemorrhage in the region of the right kidney with extravasation into the mesocolon. The liver was not damaged. No rent in the mesocolon could be found and the exact site of bleeding into the peritoneal cavity could not be determined. A large gauze strip was introduced between the liver and the upper pole of the kidney, packed firmly in place and brought out through the wound. When it was certain that hemostasis had been secured in this manner the wound was closed about the drain.

On the following day a transfusion of 250 cc. of blood was given and the patient was in satisfactory condition. The gauze pack was started on the fourth day and removed gradually, finally coming away on the seventh day. Four days later his temperature rose to 103 degrees and on the following to 105 degrees. Another transfusion was given with a rapid return to normal temperature. The temperature was thought to be due to a low-grade infection in the bloodclot.

The hematuria gradually cleared up and the patient was discharged on his forty-fourth day, with the wound healed to a small granulating surface. Examination, one year later, revealed a good scar, normal urine and no urinary symptoms. Intravenous pyelograms showed both pelves faintly. The right kidney appeared somewhat rotated. The density of its pelvic shadow and its rate of excretion of the dye were identical with the left.

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Comment: The different methods of handling the two cases are explained by the difference in the predominating symptoms. In both, the initial shock was slight and observation was employed before the decision to operate was made. In case No. 1, this resulted in symptoms of massive retroperitoneal hemorrhage, which showed no evidence of stopping. Case No. 2 showed increasing abdominal pain and tenderness as indications for intervention. This predominance of abdominal symptoms was apparently due to intraperitoneal hemorrhage, which is commoner in children than in adults, perhaps because of the comparatively small amount of perirenal fat.

It may be of interest to note that in the same year, 1932, there were three other cases of kidney injury admitted to the hospital that did not require operation. Two were simply incidences of gross hematuria following severe abdominal contusions which soon subsided without further symptoms referable to the kidneys. This condition is usually considered a "contusion of the kidney". The third was an undoubted rupture, a case of fracture of the left, transverse processes of the first four lumbar vertebrae, which developed a mass in the left side of the abdomen and profuse hematuria.

The incidence of cases requiring operation, two in five, is thus higher than usual.

NEVUS PILOSUS PIGMENTOSA CONGENITA

Its Skin Responses to Drugs*

BY MORTON S. STERN, M.D.†

NEVUS pilosus pigmentosa or hairy pigmented moles are congenital lesions which are present at birth or appear during the first few months of life. They are characterized by a pigmentation which varies from a light brown to a dark grey and present varying degrees of hypertrichosis. In size they vary from a pinhead to a lesion which may cover nearly one-half the body.

Stelwagon[1] describes them as an increase of pigment of the skin, usually of one or all of the cutaneous structures, especially of the connective tissue and hair. The pilosus type presents an abnormal growth of hair, slight or excessive, light in color or deeply pigmented, and usually coarse and of considerable length.

These nevi are not unusual in the small variety and may be multiple or single and may be located upon any portion of the body. There are, however, two types of extensive nevi arousing special interest which are relatively uncommon and are curiosities of medicine. These nevi are called the "bathing drawer" variety of pigmented and hairy nevi covering the region indicated by its name, and which are similar to the case presented here; also a more unusual type which is less common—the so-called "tippet" nevi covering the shoulders and upper part of the back[2].

The structure of the extensive types of moles is similar in nature to that of the smaller ones and grows as the body develops. As years pass they become more demarcated and more pronounced until they reach their full development, after which they remain indefinitely unchanged unless malignant degeneration occurs, which is not uncommon[3].

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Reuben describes the pathology as follows: The pigmentation is mainly due to large quantities of melanin. In the corium one finds in addition to an occasional giant cell and pigmented cells, masses of cuboidal cells arranged in columns or rows extending obliquely downward from the basal layer of the epidermis. These cells have large oval, vesicular nuclei and are probably epidermal in origin.

Fox[4] presented a case of "bathing-drawer" variety and reviewed the literature on this subject up to 1909. Dore[5] also presented a typical case of "bathing-trunk" variety. Spasmodic case reports and groups of cases are found in the literature from time to time but the infrequency of case reports since 1915 is surprising. Stratton[6] describes an extensive hairy pigmented mole on the face. Several instances of extensive nevi occurring in different parts of the body are more common than the two varieties discussed in this paper and were reported by Bircher[7]. Of the thirty-four cases collected by Bircher, fifteen were of the "bathing-drawer" type and but two of the "tippet" variety are mentioned.

Pre-natal psychic emotions are commonly mentioned as an etiological precipitating factor in most cases. Whitfield[8], Bonn[9] and others emphasize emotional upsets during early stages of parturition. In my case the patient thought her mother had been frightened by a dog during early pregnancy. Fright seems to be universally agreed upon, especially by Bircher. Theories as to the cause of such congenital lesions are, therefore, usually fanciful. Death of a twin ovum with the remnants of the tissue implanted on the living fetus is strongly considered, but in this case the patient was a twin to a still-born sister. Syphilis is considered a likely feature. The patient had a negative Wassermann test.

CASE REPORT

A twenty-two year old white unmarried female of Portuguese descent entered the Boston City Hospital on April 27, 1931 complaining of pains in right wrist and both shoulders of one week's duration. She had had a similar attack of pains in her shoulders two years ago. There had been no fever or chills accompanying these pains. Because they became progressively more severe the patient entered the hospital.

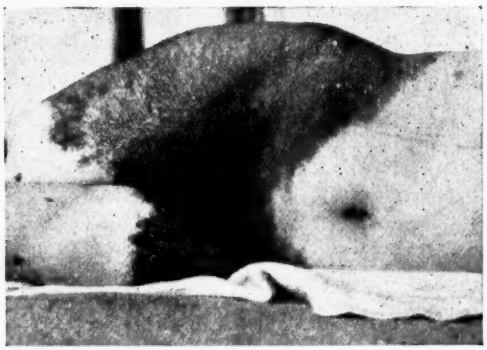

FIG. I. The line of demarcation is more abrupt than the picture would indicate. The hair in this area is uniform, coarse and approximately 2-3 inches in length. Notice the small scattered nevi on the legs.

Familial History. The patient was a twin of a still-born sister. One brother, 14, is living but has tuberculosis. One brother was still-born 12 years ago. All children are illegitimate. The mother died at about 40 of tuberculosis. The patient was certain that her mother was physically normal. No other familial diseases were elicited.

Past History. Three years ago this patient gave birth to an illegitimate child which had no deformities or abnormal conditions.

Personality was good, the patient being cheerful and happy-go-lucky but of a very low mentality.

Systemic history was negative other than a leucorrhea since childbirth.

Physical Examination. The pictures describe the lesion much better than words (figures I and II). The lesion was non-elevated but sharply demarcated from the normal tissue. It was dark grey to brownish black in color and was completely covered by moderately long coarse black hair. It extended from the seventh dorsal vertebra to the mid-thigh posteriorly, and anteriorly it ran downward to mid-way between the symphysis pubis and the umbilicus. Scattered over the rest of the body, especially on the legs, were numerous small lesions identical to the main lesion. There was a peculiar mouse-like odor emitted from the patient and perspiration of that area was moderately pronounced.

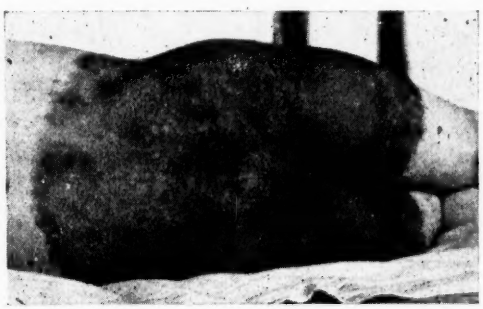

FIG. II. The hair is thicker at the margins of the lesion than in the center posteriorly. There are numerous scattered small nevi on the arms similar to these seen on the legs. None were present on the face.

No additional pathology was found.

Clinical Pathology. On admission her temperature was 98.6, pulse 80 and respirations 20 per minute. The examination of the urine was negative. Hgb. 90 per cent, rbc. 4,320,000, and wbc. 8,000 per cm. and the smear was normal.

The clinical course of the patient in the hospital is very interesting. A picket fence temperature developed and cardiac murmurs changing in type developed progressively. A positive vaginal smear was obtained and later a positive blood culture for gonococci. The patient died after 67 days, from a gonorrheal endocarditis. This feature will be reported at a later date with other cases of the same type of endocarditis.

Upon the suggestion of Dr. Soma Weiss it was thought that a study of the skin reactions of the nevus with that of normal skin would be interesting. The small nevi on the legs were used and were compared with a control of normal skin in nearby areas. The studies were made on different days and both local and systemic reactions were observed. The solutions used were injected intradermally, 0.2 cubic centimeter of the various drugs being used. It was necessary to do some of the controls after an hour or more because of the systemic reactions which developed.

The reactions of the controls with adrenalin and histamin were very similar to the responses described by Lewis[10]. It is unfortunate that some of the tests were not done by the skin prick method to compare further the capillary responses with those of Lewis. The following reveals the findings of the tests:

Adrenalin Solution 1-100,000.

Normal skin control.

Intense blanching resulted after a latent period of 35 seconds. The blanched area was about 8x9 mm. and was followed by a small wheal 2x3 mm. which appeared in one minute and twenty-eight seconds. In three minutes the wheal had disappeared and a typical white reaction appeared involving an area between 2 and 2.5 cm. Goose flesh appeared after eight minutes and persisted for twenty-two minutes with the white reaction.

The patient complained of headaches and had nervous tremors. The blood pressure became elevated, systolic 25 mm. and diastolic 10 mm. The pulse rate increased 30 beats per minute. At the end of thirty minutes no effects remained.

Nevus area.

Upon injection of 0.2 cc. of adrenalin solution there was considerable pain in the area injected. A definite wheal 4x5 mm. appeared in fifteen seconds. Goose flesh and a pilomotor response showed in forty-two seconds, with a definite oozing of sweat from the sebaceous glands in that area. There was a distinct pallor of the pigmented area after three minutes which persisted for twenty minutes. The pallor extended beyond the nevus in an area of 8x10 cm. Headache resulted and the blood pressure rose, systolic 20 mm. and diastolic 15 mm. The pulse increased 40 beats. Local and systemic manifestations gradually disappeared and were gone completely in forty-five minutes.

Atropin 1-600.

Normal skin control.

Blanching appeared in two seconds followed by a wheal in four seconds. This wheal was 3x6 mm. Intense flaring or flushing appeared in fifty-five seconds and spread progressively to an area measuring 4x6 cm., the wheal having disappeared by then. Fading at the periphery started in fifteen minutes and had disappeared in twenty-two minutes. The

pulse rate was increased by 20 beats per minute but no other constitutional changes were noted.

Nevus area.

The patient complained of intense pain locally after the injection. There was a pilomotor response in seven seconds followed by a small wheal, 2x3 mm. A progressive flush followed which spread beyond the nevus, covering an area 7x9 cm. The maximum redness was observed in twelve minutes. After twenty-seven minutes the flush had progressively and completely faded starting in the periphery.

There was constant giddiness beginning in three minutes and lasting for thirty minutes. The pulse had increased 30 beats per minute and the blood pressure was unaltered.

Histamin 1-1,000.

Normal skin control.

There was a central and local reddening appearing in nine seconds. It became circular and sharply defined and measured 2 cm. in twenty seconds followed by a flare or flush measuring 6x9 cm. in five minutes. It paled in nine minutes.

The blood pressure was increased, systolic 20 mm. and diastolic 10 mm. The pulse slowed by 20 beats per minute. Headache and restlessness started in three minutes and persisted for nearly an hour.

Nevus area.

The patient again complained of pain locally. A definite pallor and wheal focused in four seconds and was followed by a flush which was fully developed and circular measuring 7x8 mm. in fifteen seconds. A flare gradually spreading to an irregular pseudopodic form measuring 3x8 cm. and extending beyond the nevus was present and fully developed by six minutes. It progressively faded and had disappeared by twelve minutes. Goose flesh was at first seen but disappeared and oozing from the sebaceous glands was noted.

The blood pressure dropped 10 mm. both systolic and diastolic and the pulse increased 30 beats. The patient complained of fleeting cramps in her abdomen. All symptoms had disappeared in forty-five minutes.

Pilocarpin 1-60.

Normal skin control.

Blanching and a wheal appeared and was present in fifteen seconds followed by an irregular flushing measuring 2x4 cm. in two minutes. Drops of perspiration appeared in five minutes. The flush disappeared in seven minutes. The patient complained of dizziness. The pulse and blood pressure were unchanged.

Nevus area.

There was a transitory pilomotor reaction and a distinct oozing of perspiration locally which appeared in three minutes. A flushing started in forty seconds and spread beyond the nevus used. The flush was irregular and measured 3x5 cm. The flushing gradually faded and in twelve minutes had disappeared.

The blood pressure was unaltered and the pulse rate was slowed 15 beats per minute. Goose flesh appeared and lasted only three minutes before the flush.

Physostigmin 1-30.

Normal skin control.

There was no wheal formation but a definite blanching occurred in fifteen seconds. The white area was regular and measured 4x5 cm. Goose flesh was pronounced and sweating was noted.

The blood pressure fell 10 mm. systolic and 5 mm. diastolic. The pulse was increased slightly. The entire reaction lasted six minutes and a central redness appeared in three minutes. All the tissues assumed normality slowly and were completed in eight minutes.

Nevus area.

No effect was noted locally other than a small wheal 2x3 mm. This lasted only two minutes and was followed by a flush extending beyond the nevus which measured 2x3 cm. Goose flesh was pronounced.

SUMMARY AND CONCLUSIONS

A case of pigmented and hairy nevus of the "bathing-drawer" variety is presented.

Skin reactions comparing the nevi and normal skin show:

1. Adrenalin response is more rapid, more extensive and of longer duration in the abnormal skin.
2. Atropin response of the nevus is more retarded, more extensive and of a longer duration than normal skin.
3. Histamin shows a delayed reaction, a greater response and a longer duration in the pigmented area.
4. Pilocarpin reaction was delayed and reacted longer than in the normal tissue.
5. Physostigmin showed practically no skin reaction in the nevus.

So far as we are able to determine no studies on capillary response and absorption of drugs have been made upon pigmented moles. From the results obtained in this crude test it would seem that the skin responses show practically no difference physiologically and that the edge of the nevus is no barrier to normal reactions. Systemic absorption is similar and as complete in the nevus as in the normal skin.

This study was undertaken to obtain information as to whether an abnormally pigmented and hairy area due to increased ectodermal tissue differed basically in physiological activity from the normal tissue.

Due to the rapid downhill progress of the patient because of her gonorrheal septicemia and her unwillingness to be experimented upon further, no additional studies were performed.

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ON THE OPPORTUNITIES AND NEEDS FOR A MEDICAL INSTITUTION IN MASSACHUSETTS*

BY JOHN WARREN, M.D.†

Professor of Anatomy and Surgery, Harvard University

WERE the present era of this Country signalized by no other memorable event, the establishment of Institutions for the promotion of the Arts and Sciences upon the true principles of Liberality and Patriotism would have rendered it peculiarly conspicuous on the brightest pages of her history. To the honour of the present generation let it be recorded that, on the one hand, it contended with the calamities and terrors of War, and laid a foundation on which posterity could build, and, on the other, it devised the means of collecting and improving that knowledge which should be requisite for enabling future generations to complete the superstructure. By enlightening and informing the minds of men, we take the most effectual measures for securing them from the tyranny and domination which the human mind is extremely prone to usurp over such part of the species which for want of education is less sagacious than others.

THE DANGER OF IGNORANCE

The foolish are forever the eager prey of the artful, and Delinquency, Superstition and Bigotry have been built upon Ignorance. Such are the engines that have been perpetually employed against the highest liberties of men. Doubt and religious oppression generally go hand in hand. The history of Tyranny is little else than the history of Ignorance whether considered in a general sense, or with special reference to a particular nation or people. Tyranny and Ignorance have together triumphed over Reason and Common Sense, and they have together, in their time, submitted to the golden signs of Science and Light.

In the enlightened ages of the World we have generally found a people made happy under mild and peaceful governments, founded on rectitude and the reason of things. No part of the annals of any particular nation is more distinguished for the happiness of its subjects than that which contains a period of general knowledge, a taste for inquiry into truth, and a total confiscation of error. The people have ever a right to be their own electors in the preference of one government to another. When they are duly informed, they will forever exercise that right, and if they have a competent knowledge they will exercise it with discretion.

THE RELATION OF EDUCATION TO RELIGION

That the arts have equally contributed to the happiness of mankind is perhaps less incontrovertible. But that the ease and comfort of our species depend much upon the development of means which mitigate the fatigue of human labor is doubtless indisputable. We hardly need here subjoin that the pleasures which intellectual beings enjoy are especially derived from contemplation on the works of the Creator and in researches into Nature. Of all the various ranks of beings that inhabit this globe of ours, man, only, appears to be constituted particularly with the disposition requisite for praying immediately to the Supreme Being.

To cultivate so distinguishing a faculty should be the highest ambition of intelligent beings. Nothing more highly advances the dignity of human nature than knowledge which points out the connection in which man stands to an omnipotent and infinitely benificent Being. The mire of ignorance in which the ancients were immersed with respect to the operations of nature and the conformation of the material systems is one considerable reason why their notions of a Deity have been so exceedingly vague and confused. Where the system of nature was little understood and, consequently, its beauty undiscovered, it was natural enough to attribute to blind chance the various appearances of the world or to entertain ideas of the Creator derogatory to the dignity and perfection of a Being infinitely wise and good. The more natural knowledge increased, the more consistent became the knowledge of a God.

The temporal interests of mankind are an essential object of our Deity. To promote the happiness of Society is a moral obligation and a religious duty which we owe to our fellow creatures. Of all the inquiries into Nature, that which has the human species for its object is doubtless the most sublime. The human body is the seat of a rational and accountable spirit; it is the seat of those faculties which in some measure assimilate us to the Immortal Beings that surround the throne of the Omnipotent; it is an instrument and habitation of an Immortal Spirit. Therefore its study must afford us the sublimest ideas of its Creator as well as conduct us to the means of rendering existence here more easy and comfortable.

THE ORIGIN OF THE ART OF MEDICINE

It is reasonable to suppose that the most important calls of nature were in the early ages of this world first attended; the next object to that must have been the preservation of health. Such is the constitution of the human frame that unavoidable accidents are perpetually threatening it with injury and dissolution. The art of physic, by necessity having been thus brought

*An unpublished manuscript.
Submitted by Dr. Reginald Fitz.

†Warren—See "This Week's Issue," page 706.

into existence, it was more cultivated and improved in prospect to the success and relief resulting from it. Thus generating itself, it must have arrived to greater and greater perfection had it not been for the tyranny of Superstition, forever an enemy to Knowledge. To destroy Superstition is the duty of every social being in order to open the way to increase and extend the happiness of mankind.

THE NEED FOR A MEDICAL INSTITUTION IN THIS STATE

Arguments of this kind have had a due influence upon the minds of those who constituted the supreme authority of this State. We have seen an Academy instituted for the purpose of Philosophical Inquiry in general. We have seen a Society founded for the special purpose of Medical Improvement and Observation. We now see a new Institution in the establishment of Professorships for the various branches of medical and surgical instruction united with the constitution of the University that has held a place in the highest ranks of the American Seminaries of Learning. So essential is Health to the enjoyment of Life that every other blessing is in a measure founded upon it; little would the smiles of fortune, of plenty and of peace avail the man who is tortured with pain or whose limbs have been mangled by an adverse accident of life.

Heretofore the advantages that have been enjoyed in this part of the Continent for obtaining a competent knowledge in the healing art and alleviating the pains of our fellow creatures have been extremely limited and subjected to the greatest discouragements. The consequence has been that many of our fellow countrymen who have determined to qualify themselves for the duties of this profession have crossed the Atlantic in pursuit of this object. Much money has been drained from this Country by these means, and we have been indebted to a foreign Country for that improvement of knowledge, of which, a little attention to the subject at home would have furnished with the means.

THE ADVANTAGES OF MEDICAL EDUCATION IN THIS COMMUNITY

This may perhaps be disputed by some, because the advantages of Hospitals can never be as great here as in a more populous Country. How far this observation may be just, I will not pretend to determine, but this I will say, that it is not numbers of sick which constitute the difference in advantages for medical improvement, but upon accurate attention to Nature in a moderate number of diseases. A small number attended in this way is better for this purpose than a much larger, because the human mind is not capable of comprehending accurately the varieties and changes that must necessarily be constantly taking place in a large number of patients, and confusion must necessarily ensue. The great business is to be thoroughly acquainted with the nature of disease in general, and then of such differences in them as point out a different process in the mode of cure. Any other differences are by no means so essential as may be imagined, unless for the purpose of ostentation or a useless distinction for rendering the medical art more complex and abstruse. It may be objected, though this be acceded to, yet that the variety of cases which must necessarily occur amongst a large number of sick, by exhibiting instances of very extraordinary cases, must be extremely useful to the student. There is doubtless weight in the argument but it is by no means so great as at first view might be imagined. Extraordinary cases are by no means the most useful. The principles of Physic are to be established by common and ordinary diseases and not by those which seldom make their appearance. These are rather deviations of Nature from her regular and usual line and therefore but little of Nature is to be learnt from them; they will seldom, if ever, occur in future and we may probably never be called upon for assistance in similar cases. The others will daily occur and if they are duly attended to will furnish us with the requisite data for judging of all other diseases however rare they may be. Assiduity and application will produce great effects.

Students here will, I think, *ceteris paribus,* attend with at least as much intensity to their cases under inspection as they would were they abroad. A multiplicity of objects will naturally call for some place of a stranger's attention and avocations from the principal object will by no means be uncommon. At home the case is generally different. There are few novelties to call students from their business and they will be more likely to make progress in their pursuits.

OPPORTUNITIES FOR LEARNING ANATOMY IN EUROPE AND AMERICA

With respect to Anatomy, the great basis of all medical and surgical knowledge, it may be urged that our advantages can never be so great as abroad. In old countries, it is granted, capital executions are so frequent as to furnish the anatomist with great numbers of subjects for dissection and demonstration, whereas in a country less populous, less vicious and corrupt, such opportunities are to be expected very infrequently to present. But it may be inferred that the very great advances which have been made towards liberality and good sense within a few years last past, afford a happy presage of a general banishment of the superstition and ignorance on which objections to anatomical inquiries are founded. It is sincerely my opinion that at the present day the people here are as little chargeable with this kind of folly as in most parts of Europe. A general inquiry into

the workings of human nature has opened many collateral channels of light and information. People have learned to think for themselves on other subjects as well as politic. Ignorance is daily losing ground.

PERORATION

The European institutions of Edinburgh and Leyden have acquired much reputation for the advantages they afford. The University at Philadelphia, founded about twenty years ago, has been highly celebrated for its rapid advancement towards benefaction. The honor of a similar Institution in this part of the United States has been reserved for the Board of Overseers who conduct the affairs of Harvard University. Under the patronage of the two branches of the Legislature and our free Republican Constitution, we hope to see the new Institution flourishing with advantage to public utility.

To the President who now stands at the head of the immediate government of the University, the thanks not only of us but the public are due for the strenuous exertions he has made for the happiness of society and the dignity of this State. From one who has so much at heart the success of this University we need not ask for support.

The Honorable, Reverend Board, over which he presides, have shown their zeal in the cause, and may they all live to see the Institution flourish under their encouragement and patronage. May the persons honoured by an election to fill the several professorships of this Institution, by a careful discharge of their duty, justify the trust and confidence placed in them.

From the public we doubt not of receiving countenance. We trust that the advantages of improvement in the healing art are considered as eventually affecting the interest of every individual of this State. Hence the State will readily afford assistance in establishing the proper means of Medical Education that the ignorance and presumption of those who inadvisedly undertake the practice of this art without due qualifications, may be put out of countenance, and punished with a total banishment from this fine and happy Country.

HOME ACCIDENTS INCREASE AMONG ADULTS

The home is becoming a more hazardous place for grown-ups but a safer place for children.

In the experience of the Metropolitan Life Insurance Company, the rate from fatal accidents in the home rose nearly 42 per cent among persons at ages fifteen and over, between 1924 and 1932; and the rate from these accidents, last year, was the highest on record. The increased number of men and women killed in domestic accidents may be a reflection of the business slump which has forced large numbers of persons to remain at home, who, in normal times, would be employed elsewhere during a large part of the day.

The increased hazard in the home appears to be due entirely to the greater number of fatal accidents involving falls. Each year since 1924 has shown an increasing number of accidents of this type. In that year, one-third of all fatal accidents that occurred to adults, while engaged in activities in and about the home, were due to falls, but in 1932 this single class accounted for more than one-half of all the domestic accidents. With respect to fatalities following accidental burns, no similar increase has been observed; in fact, the deathrate from this class of accident has remained on practically the same level throughout the nine-year period. Asphyxiations by gas are fewer now than ever before. Accidents, other than falls, burns and asphyxia by gas, have varied in number from year to year; in the last three years, however, the rate from the group of miscellaneous accidents has been somewhat above average.

Among children, the trend of the deathrate from domestic accidents has been definitely downward. In the experience of the Metropolitan Life Insurance Company, the rate from home accidents declined nearly 23 per cent among boys and girls below age 15, in the past nine years. A low point in the accident record for children was reached three years ago, and since then the rate has remained at about the same low level. It is interesting to note that, whereas formerly children suffered a higher deathrate from domestic accidents than did adults, the reverse has been true for the three past years. The teachings of the safety education campaigns conducted in the schools seem to have carried into the homes as well as onto the streets, where there has been, also, a reduction in the number of childhood accidents. The decline in the deathrate from domestic accidents among children is largely the result of a significant decrease in the number of accidents involving burns. The decrease in the number of burns resulting fatally accounts for about one-half of the gains made in the reduction of home accidents. The remainder of the gain results from the lower death toll from the miscellaneous group which includes poisoning, cuts and other accidents that occur in the home, to children. Falling is not the frequent cause of child fatalities that it is among adults, and the hazard to children from this source has not increased during the last nine years. — *Statistical Bulletin, Metropolitan Life Insurance Company.*

CASE RECORDS
of the
MASSACHUSETTS GENERAL HOSPITAL

ANTE MORTEM AND POST MORTEM RECORDS AS USED IN WEEKLY CLINICAL-PATHOLOGIC EXERCISES

EDITED BY RICHARD C. CABOT, M.D.
F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 19401*

EPIGASTRIC DISCOMFORT FOR THREE MONTHS, FOLLOWING PREVIOUS LEAD POISONING

SURGICAL DEPARTMENT

PRESENTATION OF CASE

DR. WALTER E. GARREY**: *First admission.* This is the case of a forty-six year old Italian plumber who came to the hospital for the first time two years and nine months before his final entry complaining of very severe cramp-like upper abdominal pain of two days' duration, causing him to roll on the floor in agony. His doctor sent him in with a question of acute lead poisoning.

We found a lead line and stippling of the red cells, but were not convinced that the trouble was due to lead poisoning. Obstruction was suspected, but further studies showed no evidence of obstruction. Enemata gave good results. The pain disappeared very promptly after he entered the hospital. A barium enema showed a very spastic colon. No other studies were done. The patient was discharged eight days after entry.

History of interval. Nothing more was heard from him until a year and eight months later, when he came to the Outpatient Department. He stated that since discharge he had had only rare abdominal discomfort until three months before the visit. During the three months' interval he suffered with a nearly constant feeling of heaviness in the subxiphoid region partially relieved by taking food. A blood smear showed no stippling. A barium enema was negative. X-ray examination of the stomach showed an irregular filling defect in the lesser curvature. Accordingly he was at once admitted to the wards.

Second admission. He reëntered on the Medical service nine days after the first visit to the Outpatient Department.

Blood studies were not remarkable. One stool examination gave a weakly positive guaiac. The others were negative for occult blood. One stool showed a trace of lead, but no clinical evidence of lead was found.

Gastro-intestinal x-rays were repeated three times. These examinations all confirmed the findings at the examination in the Outpatient Department.

Operation was advised and he was transferred to the Surgical service. As he developed an acute respiratory infection, it was decided to send him home to get over it and to return for exploration.

Third admission. He returned eleven days later with his cold still present. He complained of very acute epigastric pain, so severe that he could not bear it any longer.

He was admitted to the Medical service and was kept there for a few days, then transferred to the Surgical service, where an exploratory operation was done.

DR. GEORGE W. HOLMES: The striking thing about his x-rays is shown in these two films. There are enormously thickened gastric rugae.

This second film shows again the prominent thickened rugae and large filling defect at the cap.

This is a film of the colon and shows nothing particularly remarkable.

DR. GARREY: Dr. Young operated in this case, found a very peculiar lesion and took a specimen for biopsy.

Following operation the patient's temperature and pulse rose and he developed a rigid upper abdomen. Three days after operation he died from what we thought was general peritonitis.

CLINICAL DISCUSSION

IN DR. CABOT'S CLASS

DR. MAURICE FREMONT-SMITH: One cannot make a diagnosis of lead poisoning on a lead line. That simply means that lead has been absorbed. Stippling is pretty good evidence of lead poisoning unless it comes from something else, and the stippling of lead poisoning is more grey than the stippling in secondary anemia. I think we can tell more definitely from the finding of lead in the urine and from x-ray examination. Don't you get changes in the epiphyses in lead poisoning?

DR. HOLMES: We get spastic changes in the colon that suggest lead poisoning. They occur also in other conditions.

DR. FREMONT-SMITH: Do you get changes in the bones?

DR. HOLMES: Not in adults,—in children.

DR. FREMONT-SMITH: Could that feeling of heaviness in the seven months before the second admission be explained by lead poisoning? Did he keep on with his lead work? Did he take precautions? We probably could not explain

*The following report gives the essentials of two discussions, one in Dr. Cabot's Third Year class, one at a conference of the hospital staff.

**Senior interne on the East Surgical service.

it by lead poisoning in any case. It would be interesting to know what happened to him during the interval. What else could explain the epigastric discomfort? Did he have an ulcer? The almost constant pain, the only thing that is consistent with ulcer, is very rare except with a penetrating ulcer, and I should imagine that a penetrating ulcer would have perforated after six weeks if it had been causing constant pain day and night. In a man of forty-four any intestinal symptoms coming out of the blue always make us think of cancer of the stomach. The picture may be blurred by the fact that he had stomach symptoms before. Could the whole thing be due to cancer of the stomach beginning two years earlier? Cancer of the stomach does not usually give generalized abdominal pain, does not usually give pain at all, but lack of appetite, loss of weight, hemorrhage or obstruction. So I do not believe he had had cancer for two years. He may have cancer now. He may have penetrating ulcer.

I wonder what they mean by "no clinical evidence of lead poisoning." I think it would have been perhaps better to say "examination negative; no lead line, no abdominal cramps." I do not know what the other clinical evidences of lead poisoning are.

A STUDENT: Neuritis.

DR. FREMONT-SMITH: Yes, that certainly would be one. A marked anemia would be, with characteristic stippling. Of course you can have a lead encephalitis, and sometimes people who have stored lead in their bones may through fever or starvation or any cause for acidosis free that lead and get encephalitis.

One weakly positive guaiac test would mean nothing. The others were negative. That is pretty good evidence against carcinoma.

DR. HOLMES: I have always felt that it is almost useless to attempt to interpret gastro-intestinal findings from the films alone.

These greatly thickened gastric rugae may represent an early ulcer, but I should like to have seen the stomach under the fluoroscope.

DR. EDWARD L. YOUNG, JR.: Would the filling defect at the cap represent the saddle ulcer?

DR. HOLMES: I am not sure that it does. It is possible that the deformity represents an ulcer, or it may be that there is nothing there.

If we accept the fluoroscopic evidence we have increased peristalsis and irritability of the colon with very prominent gastric rugae and a deformity that was thought to be a saddle ulcer.

Dr. Martin in some studies of lead poisoning found that one of the things that these cases showed was increased peristalsis and spasm in various parts of the gastro-intestinal tract, also in some cases prominence of the gastric rugae. Another thing that causes prominent rugae is the gastritis accompanying ulcer. The cases showing the most prominent rugae of all are seen in lymphoma of the stomach. From the evidence we have here the diagnosis should be one of these three things.

DR. FREMONT-SMITH: That does not look like an ulcer to me. It looks more like a carcinoma.

DR. HOLMES: I certainly should have said carcinoma from the film. The deformity does look like carcinoma, and the rapid emptying is also in favor of cancer. We have good evidence of a lesion on the lesser curvature of the stomach, but the findings are not quite sufficient to differentiate cancer and ulcer.

DR. FREMONT-SMITH: Wouldn't you expect a lesion as large as that, if it were cancer, to give blood in the stools?

DR. HOLMES: I do not know. It is very hard to say how large the lesion is. A great part of this deformity may be due to spasm.

DR. FREMONT-SMITH: It was a frankly exploratory operation with a preoperative diagnosis, in my opinion, of carcinoma of the stomach. I do not understand the early part of the history. I think perhaps we have to help ourselves out with the diagnosis of lead poisoning two years earlier. I believe we can have changes in the vagus due to lead poisoning, and that with those changes there have been ulcers of the stomach reported.

(OPERATION)

FURTHER DISCUSSION

DR. FREMONT-SMITH: Again and again this situation occurs, that we are unable to decide between ulcer and cancer, have an atypical story, do not find blood, are unable to reason it out, and it proves to be a lymphoblastoma. It is something to be thought of. Was there anything here, Dr. Holmes, to make us think of lymphoblastoma?

DR. HOLMES: There was, and I think you have mentioned the most important point in making this diagnosis. Usually we do not think of it.

DR. FREMONT-SMITH: How about the time limit? Could he have had lymphoblastoma two years earlier?

DR. HOLMES: Yes; and the lesion may be entirely in the intestinal tract. It is not necessary to have enlarged glands or involvement elsewhere.

DR. FREMONT-SMITH: We had one case of lymphoma of the nervous system.

DR. TRACY B. MALLORY: Yes, it involved that along with other things.

DR. HOLMES: The spasm in the colon might suggest lymphoma, but I think with the history of lead poisoning that would be a better interpretation. There is a tendency to spasm in lymphoma, also in carcinoma.

DR. FREMONT-SMITH: Away down in the colon?

DR. HOLMES: No, not in the colon.

DR. FREMONT-SMITH: I should say he had every reason to have a peritonitis, though he may not have had it. Dr. Mallory, are lymphomas more apt to be primary in certain regions? In other words, lymphoma would not be primary in the central nervous system yet could be in the stomach or intestine or in the glands?

DR. MALLORY: No tumor can be primary in any organ where the type cell from which it arises does not occur. Of course lymphocytes can wander anywhere in the body, so it is theoretically possible for the tumor to start anywhere, but practically speaking I think we almost never would see a very early stage of lymphoma except where lymph tissue is normally present. In the usual case of lymphoma I think it is utterly impossible to say where it was primary because at the time we see them first multiple areas are already involved. Almost the only group in which we can definitely say "it was primary here" is the gastric and intestinal group, and in those cases the disease may run its course in the intestine practically without ever getting out of it so far as we can make out. It can occur anywhere in the whole length of the tract. The stomach is the commonest primary site I should say, the small intestine the next. It is not nearly so common in the large intestine.

DR. FREMONT-SMITH: What success would you have been likely to have with x-ray treatment if the diagnosis had been made?

DR. HOLMES: There is a certain risk in treating a hollow viscus in which there is a sensitive tumor. A slight overdose may cause rapid necrosis. On the other hand, when we have known that we were treating this tumor and went about it carefully, good results have been obtained. The best results are in cases that have been operated upon and followed with radiation. We have some living cases that were operated upon over ten years ago.

DR. MALLORY: There are some reported cures from surgery alone that have run five to ten years. So if the lesion is operable I think surgery is worth a trial. I think gastro-intestinal lymphoblastoma is the only type of lymphoma in which there is reason to think there may be cure from surgery.

CLINICAL DISCUSSION

AT STAFF CONFERENCE

DR. GARREY: The diagnosis at his first discharge was toxic colitis and questionable lead poisoning.

The impression from the repeated gastro-intestinal series was of saddle ulcer located on the lesser curvature of the stomach.

DR. YOUNG: Didn't he have a gastroscopy?

DR. GARREY: It was the first gastroscopy that was done in this hospital. It was done during the second admission on the Medical service. They found very little. They did not see the lesion.

DR. YOUNG: Gastroscopy in a case like this, if it would give a reliable picture, would be of tremendous importance of course. It might save exploration, which was necessary here to make a diagnosis.

When the stomach was exposed the omentum was plastered over the whole anterior surface. When that was freed there was a smooth white surface extending from about half an inch below the esophagus down to a point below the middle of the stomach, a very extensive thing with a peculiar feel. It did not show metastases outside to any palpable extent. It seemed essential to open the stomach in order to make a diagnosis so as to guide future treatment.

On opening the stomach it proved to be a soft neoplasm with an ulcerated surface. A biopsy was done and we closed the wound. Because of the ulceration we were sorry we had to open the stomach. The patient died with peritonitis, coming I think from the infection on the ulcerated surface of the neoplasm.

The thing that was interesting to me was his combination of anemia and symptoms with the x-ray finding that was not characteristic of the ordinary lesion. I think another time with that combination I should be very suspicious indeed of lymphoma, and I certainly should avoid opening the stomach in the face of such a picture.

DR. HORACE K. SOWLES: I believe I saw this man, but I do not remember much about his story.

I should like to ask the Surgical staff how they feel about these saddle ulcers. I have an impression that if we studied a large series of these we should find that the operative mortality would be better with partial gastrectomy rather than with V excision, because the aseptic technic of the V excision is more difficult and it is harder to get the sutures accurately placed on the posterior side of the stomach. I think a great many of the patients who have had a V excision have had postoperative peritonitis.

DR. YOUNG: I did not see in this case how there was any chance of doing anything for it. There was no question of saddle ulcer. It was a very extensive new growth.

CLINICAL DIAGNOSES (FROM HOSPITAL RECORD)

Lymphoblastoma of the stomach.
General peritonitis.

DR. MAURICE FREMONT-SMITH'S DIAGNOSIS

Carcinoma of the stomach.

ANATOMIC DIAGNOSES

1. *Primary disease.*
Lymphoblastoma of the stomach.

2. *Secondary or terminal lesions.*
Operative wound, gastrotomy.
Generalized peritonitis.

PATHOLOGIC DISCUSSION

DR. MALLORY: The lesion here was a very large one on the lesser curvature with saddle distribution on each side of the curvature, and involved the upper third of the stomach. The remainder of the stomach showed an extreme degree of thickening of the rugae, a chronic gastritis. The lymph nodes in the mesentery were as usual entirely negative. On several occasions we have been given a node close to the tumor in the stomach and have been entirely unable to make a diagnosis. A few weeks later at autopsy it is obvious that it is lymphoma of the stomach. I do not see why in these cases the regional nodes are so regularly uninvolved. They may be quite big but histologically show only simple hyperplasia.

DR. HOLMES: Was there any tumor elsewhere?

DR. MALLORY: No. The autopsy was somewhat restricted, but we found no evidence of tumor anywhere else. The immediate cause of death was general peritonitis.

There was no evidence whatever of lymphoma in any other part of the body. This is a lymph node from the immediate region of the stomach. It shows good germinal centers, typical lymph node architecture, with dilated sinusoids, nothing to suggest lymphoma.

DR. HOLMES: I should like to say a little more about the diagnosis of lymphoma by x-ray. Dr. Martin has reviewed the literature carefully and gone over our material recently. There are one or two signs that seem to be of some value. Lymphoma of the gastro-intestinal tract is often a multiple lesion. It is probably the most common multiple lesion in the gastro-intestinal tract. When one finds a multiple lesion by x-ray one should always think of lymphoma. Perhaps the diagnosis is missed more often by not thinking of it than from any other known cause. The appearance by x-ray when the disease is confined to the stomach is that of carcinoma more than of ulcer. I think it is rather unusual to have a case like this one that resembles ulcer more than carcinoma. I do not know any way of distinguishing positively lymphoblastoma from carcinoma, or as Dr. Jones suggests, from syphilis. The lesion of syphilis is apt to be in the pyloric end of the stomach and to give a characteristic cone shaped deformity with rather smooth margins, and the rugae are not prominent.

One of the striking things about the lymphomatous lesions is the prominence of the gastric rugae, even more than in ulcer or carcinoma. Possibly that might be of some value in differentiating carcinoma and lymphoma. The rugae are enlarged to some extent in carcinoma, but not to any such extent as in lymphoma.

Another differential point is that during fluoroscopic examination a carcinoma the size of this lesion would probably be palpable, whereas in lymphoma it is rather unusual to feel the lesion even though it may give considerable deformity.

DR. MALLORY: Have you anything to add, Dr. Jones?

DR. DANIEL F. JONES: Nothing, except that I should like to call attention to the rugae, which are much more prominent in lymphoma than in the cases that I have seen which have been called syphilis. I have seen four cases of syphilis of the stomach in which the rugae were not at all prominent but there was a great contraction of the stomach. I have also recently seen a man upon whom I operated twenty-two years ago. His stomach has now entirely disappeared except for a very small cap at the cardiac orifice, and the barium goes directly from that into the gastro-enterostomy which was done twenty-two years ago. He has been treated for syphilis for a long time. Apparently the disease has gone all through the whole stomach. None of the stomachs had prominent rugae, but the stomachs were definitely contracted as shown by the barium meal.

DR. MALLORY: I think there is no question that syphilis of the stomach must be considered in differential diagnosis. It is a very rare disease and still more rarely gets into the hands of the pathologist; of course it should not reach the pathologist.

DR. YOUNG: I wonder if treatment by x-ray would help?

DR. HOLMES: Lymphoma as a general rule is sensitive to radiation and disappears promptly when the proper dose is applied. I am not at all certain that it will recur in the same area. Our experience is that the lesion probably recurs in three to six months and keeps recurring until eventually the patient dies. We have never had an opportunity to treat localized lymphoma. It ought to be possible to destroy the lesion completely if it were local.

In the treatment of the hollow viscus the danger of rupture by the softening of the lesion following radiation is great. It is however not impossible to treat lymphoma of the hollow viscus. The number of deaths following treatment is very small. In fact I know of only one case in which death can be definitely attributed to the radiation. I believe if we went about it carefully, knowing exactly what we were treating, it would be possible to treat this type of case successfully. Still I think I would rather have it removed.

A PHYSICIAN: I think that from the point of view of x-ray treatment we must distinguish two types of lymphoma of the stomach. One is shown by this case and originates in the stomach. In another group—we have eight or nine cases now—we have lymphoma secondary to generalized lymphoma elsewhere. I have been in-

terested to find that a great many of these secondary lymphomas apparently give stories of low grade duodenal ulcer. That is really what we might expect. If we are dealing with infiltration around an old ulcer we are apt to get tumor lymphocytes in that same area. We have five or six cases which we have handled very well by radiating directly on the stomach without opening, because we all knew the diagnosis.

CASE 19402

MURAL TUMOR OF THE STOMACH

Surgical Department

Presentation of Case

Dr. Champ Lyons*: This is the case of a sixty-seven year old Canadian who was referred to this hospital from another Boston hospital on the basis of findings in a series of gastrointestinal x-ray films and because of epigastric discomfort.

Six months previously he had one attack of nausea in which he vomited a pint of green bitter material. Subsequently he had good health until five weeks previous to admission, when he had epigastric pain and gaseous eructations coming on thirty minutes after the intake of food and not relieved by soda or by taking more food. He had a five-pound weight loss during that time.

On admission he was thin but apparently in excellent condition. The blood showed moderate secondary anemia with a hemoglobin of 70 per cent. The stools contained no blood. The nonprotein nitrogen was 30.

He ate the house diet and did very well. He had very little discomfort while in the ward.

The x-ray report showed that there was a constant one-inch filling defect on the greater curvature of the stomach about one inch from the pyloric end. Peristalsis passed over the lesion down to the pylorus without interruption.

Dr. James R. Lingley: I think the lesion showed much better by fluoroscope than on the films. It was on the greater curvature side and showed as a small filling defect.

Dr. Lyons: Six days after entry operation was done. On his return to the ward the patient was conscious and according to the nurse talked and observed in normal fashion. Three hours later the temperature began to rise and the pulse to fall and he became semiconscious. The extremities remained warm. He gradually developed increasingly shallow and rapid respiration. Eighteen hours after operation the condition was one of cyanosis, coldness of the extremities, rapid pulse rate and low blood pressure. Symptoms of decreased blood volume appeared and transfusion was done. He rallied somewhat from this and gradually returned to his previous state. He was placed in an oxygen tent. At no time did it seem that there was any evidence of blood in the peritoneal cavity. Aspiration of the stomach gave half an ounce of blood tinged fluid. Twenty-four hours after operation he died.

*Senior interne on the West Surgical service.

Clinical Discussion

Dr. Lingley: The fact that peristalsis passed through the lesion shows, I think, that there was no infiltration of the surrounding wall, and that the lesion could be benign.

Dr. Lyons: The diagnosis made at the hospital from which the patient was referred was carcinoma of the stomach.

Under avertin anesthesia an exploratory operation was done by Dr. Leland. A small fixed nodule in the stomach wall was found. The surrounding stomach was mobile. A Billroth II resection went very smoothly from a technical point of view. The man returned to the ward after two hours and fifteen minutes, the time it took to do the operation, and five hours after the introduction of anesthesia.

Dr. George A. Leland: There is not much to be added to those details. The lesion was in the stomach exactly as described by the X-ray Department. On palpation it appeared not to be malignant. It was irregular, protruded into the lumen of the stomach from the greater curvature, and could be snapped back and forth with the fingers. There was no evidence of infiltration or lymph node enlargement to suggest malignancy. The stomach was opened and a Billroth II operation done without difficulty.

Clinical Diagnoses (From Hospital Record)

Gastric polyp.

Anatomic Diagnoses

"Carcinoma in situ" of the stomach.
Operation wound, partial gastrectomy.
Possible anesthetic death.

Pathologic Discussion

Dr. Tracy B. Mallory: The tumor in this instance was a relatively small one. I have the major portion of it on this slide. It is polypoid with a very definite pedicle. There is no trace whatever of invasion at the base. The tumor consists of atypical dilated glands fairly far removed in appearance from normal gastric glands. Here is normal gastric mucosa at one edge of the lesion. As we pass around to the base of the pedicle suddenly we come to what is frank tumor. The cells no longer secrete any mucus. They stain more intensely than the normal cells and we begin to find quite numerous mitotic figures. It is very obvious that we are dealing with a true neoplasm and not the

mere polypoid hypertrophy of the gastric mucous membrane that is often classified as a polyp. When we follow the margin of the tumor around we see that the character is essentially the same in all parts. We again come back to the base of the pedicle and find normal gastric mucosa on the other side except for a slight degree of chronic inflammatory infiltration. At the base of the pedicle the muscularis mucosa runs all the way around and there is no trace of invasion through it.

The morphology of the tumor cells themselves is essentially that of malignancy. Any single high power area in this portion of the tumor I think one would have to call carcinoma. At the same time we have no evidence of invasion, but the findings are identical with the condition that Broders has described as carcinoma *in situ*. Whether or not it should really be called cancer at this stage is something no one can say at the present time. I should think that with a tumor of this sort there is probably no danger whatever of a local recurrence, with the lack of invasion at the base, and that by simply removing the tumor and its pedicle one has either cured the case or it is possible that extensive metastasis has already taken place, in which case there would be no hope of cure.

The autopsy, which was unfortunately only a limited one, showed no cause of death. There was no peritonitis. We did not have an opportunity to examine carefully the heart and lungs. There was no postoperative hemorrhage. At the time of autopsy we attributed the death to the anesthesia. Dr. Lyons' description of the symptoms suggests that that was incorrect, as the patient came completely out of his anesthesia. I shall be interested in any views that you may have as to why this man died, because we see a considerable number of cases with abdominal operations of no extreme severity dying with as little apparent morphologic cause as this man had. Dr. Leland, have you any feeling about it?

DR. LELAND: Nothing very specific, except that perhaps we overestimated his ability to go through such a procedure. Even though a gastric resection may be apparently accomplished without any great discomfort to the patient or loss of blood, that is only a comparative estimate, and any operation that takes over two hours is a shocking one. The necessity of placing a patient under complete anesthesia is in itself contributive to shock. I think this death was due to a combination of operation and anesthesia, not primarily an avertin death as such. I have nothing further to add.

A SURGEON: Did you examine the liver microscopically?

DR. MALLORY: I have not seen the sections yet. Grossly it was negative.

DR. EDWARD D. CHURCHILL: I do not agree with the statement that because he recovered consciousness we can exclude avertin as the cause of death.

DR. DANIEL F. JONES: If avertin is excreted by the liver and you put a man under operation for two hours and forty-five minutes I should think that avertin would be a very definite cause of death in such a case.

DR. MALLORY: I have not looked at the slides of the liver in this case. I have had at least half a dozen of what I believe were avertin deaths and I found nothing abnormal in any of them.

DR. JONES: The liver does not function very much after a two hour and forty-five minute operation probably.

DR. MALLORY: I do not believe we know.

DR. LELAND: There is no question but that the kidney functions. Avertin is used for that reason, because the kidney does function, in cystoscopies at the Children's Hospital.

DR. MALLORY: I think we have to admit immediately that postmortem examination is not going to solve the method of death in any of these cases. It is going to require a careful physiological study of these cases in the last few hours of life before we can come to any conclusion. Morphologically I am quite sure there is no way of knowing.

A PHYSICIAN: Has the blood sugar been done on any of these patients when in extremis?

DR. MALLORY: I do not know.

A PHYSICIAN: Was there any free acid in the stomach contents?

DR. LYONS: No.

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RESPONSIBILITIES OF SPECIALISM

SPECIALISM is an ancient tendency in medicine, persisting until today, and likely to endure to the end of the art. It has stimulated critics at least since the days of the Athenian, Socrates, and in the changing organization of society will present new sides for attack. The chief criticism directed against the specialist is that he concentrates his attention upon the part, and forgets or ignores the existence of the whole which gives the part its value. Fortunately this estimate of the attitude of these practitioners does not always apply, especially in the case of the doctor who has grown into specialism after experience in general practice. It has been a tendency too often to forget that it is a person who is ill that the doctor is called upon to treat, and not a disease, that he is expected to remove, existing out of relation to the patient. So, too, in the field of knowledge, he tends to forget that it is but a small part of the field he is cultivating, and that there may be methods, procedures, ideas and even facts in other fields that might assist him if he were familiar with them. Indeed it is often an idea from another field that proves most fertilizing.

Is the specialist aware of his obligations to the profession as a whole? He has his special journals and societies, which may take all the time he thinks he can spare for that sort of thing, and certainly by contact with those who are pursuing the same aims in the special field, he receives great stimulus. But are there not broad conceptions of his obligations which he may well pursue in association with all the members of his profession? Are there not objectives which all members of the profession should seek in common? The existence of such an institution as a state-wide medical society indicates the general awareness that common problems exist and that a broad sympathy therewith demands expression by formal organization.

Specifically, do the specialists of Massachusetts play as important a part in the affairs of the Massachusetts Medical Society as they should in accordance with their number, influence, ability and distinction in their limited fields? From time to time the impression is given that they do not. Yet the Society, the profession organized for the accomplishment of common purposes, needs them; and they need the participation in the movements toward reaching the common objectives of the profession. Here is a situation to which the attention of specialists and non-specialists may well be directed. It is not that they are now antagonistic; but are they taking thought that they may work together as much as possible for the welfare of the profession of which each is but a part?

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

LEVINE, SAMUEL A. A.B., M.D. Harvard University Medical School 1914. Assistant Professor of Medicine, Harvard Medical School. Senior Associate in Medicine, Peter Bent Brigham Hospital. Address: 270 Commonwealth Avenue, Boston, Mass. Associated with him are

CUTLER, ELLIOTT C. A.B., M.D. Harvard University Medical School 1913. F.A.C.S. Moseley Professor of Surgery, Harvard Medical School. Surgeon-in-Chief, Peter Bent Brigham Hospital. Address: Peter Bent Brigham Hospital, Boston, Mass. And

EPPINGER, EUGENE C. A.B., M.D. Harvard University Medical School 1930. Resident Physician, Peter Bent Brigham Hospital. Assistant in Medicine, Harvard Medical School. Address: Peter Bent Brigham Hospital, Boston, Mass. Their subject is "Thyroidectomy in the Treatment of Advanced Congestive Heart Failure and Angina Pectoris." Page 667.

SPRAGUE, HOWARD B. A.B., M.D. Harvard University Medical School 1922. Assistant Physician, Massachusetts General Hospital. Visiting Physician and Research Director, House of the Good Samaritan. Assistant in Medicine, Harvard Medical School, Courses for Graduates. Address: 270 Commonwealth Avenue, Boston, Mass. Associated with him are

ERNLUND, CARL H. D.M.D., Harvard Dental School 1917. M.D. Harvard University Medical School 1922. Laryngologist at the Massachusetts State Cancer Hospital, Pondville, and the New England Deaconess Hospital. Assistant Surgeon at the Massachusetts Eye and Ear Infirmary, and the Palmer Memorial Hospital. Address: 5 Bay State Road, Boston, Mass. And

ALBRIGHT, FULLER. A.B., M.D. Harvard University Medical School 1924. Instructor in Medicine, Harvard Medical School. Visiting Physician, Massachusetts General Hospital. Address: Massachusetts General Hospital, Boston. Their subject is "Clinical Aspects of Persistent Right Aortic Root." Page 679.

LEVENE, GEORGE. M.D. Boston University School of Medicine 1925. Roentgenologist, Massachusetts Memorial Hospitals. Member of Senior Staff, Evans Memorial for Clinical Research and Preventive Medicine. Assistant Professor of Roentgenology, Boston University School of Medicine. Address: 345 Winter Street, Norwood, Mass. Associated with him is

WHEATLEY, FRANK E. B.A., M.D. Tufts College Medical School 1914. First Assistant Roentgenologist, Massachusetts Memorial Hospitals. Associate Member in Roentgenology, Evans Memorial for Clinical Research and Preventive Medicine. Assistant Professor of Roentgenology, Boston University School of Medicine. Address: 520 Beacon Street, Boston, Mass. Their subject is "Carcinoma of the Stomach in a Girl Aged Nineteen." Page 686.

HOPKINS, FREDERICK S. A.B., M.D. Harvard University Medical School 1918. F.A.C.S. Assistant Visiting Surgeon, Fracture Service, and Director of Cancer Clinic, Springfield Hospital, Springfield, Mass. Consulting Surgeon at Shriners' Hospital for Crippled Children. Physician to International Y. M. C. A. College. His subject is "Fractures of the Scaphoid in Athletes." Page 687. Address: 146 Chestnut Street, Springfield, Mass.

CHANG, C. S. M.D. Severance Union Medical College, Korea, 1916. Assistant Bacteriologist, Lakeville State Sanatorium, Middleboro, Mass. His subject is "Human and Bovine Infection in Extrapulmonary Tuberculosis." Page 690. Address: Lakeville State Sanatorium, Middleboro, Mass.

ADAMS, DONALD S. M.D. University of Virginia Department of Medicine 1917. F.A.C.S. Assistant Surgeon, Memorial Hospital, Worcester. Address: 36 Pleasant Street, Worcester, Mass. Associated with him is

WHEELER, BANCROFT C. A.B. Harvard University Medical School 1920. F.A.C.S. Assistant Surgeon, Memorial Hospital, Worcester, Mass. Address: 27 Elm Street, Worcester, Mass. Their subject is "Traumatic Rupture of the Kidney." Page 693.

STERN, MORTON S. B.S., M.D. Cornell University Medical College 1928. Assistant in Medicine, Beth Israel Hospital, Boston. Teaching Fellow, Tufts College Medical School. Assistant in O. P. D. (Cardiology) Boston City Hospital. His subject is "Nevus Pilosus Pigmentosa Congenita. Its Skin Responses to Drugs." Page 694. Address: 371 Commonwealth Avenue, Boston.

WARREN, JOHN. A.M., M.D. (Hon.) Harvard 1815. Professor of Anatomy and Surgery, Harvard University 1782-1815, a founder and seventh President of the Massachusetts Medical Society, author of the first paper in the first volume of the *New England Journal of Medicine and Surgery**. His subject is "On the Opportunities and Needs for a Medical Institution in Massachusetts." Page 697. This paper is abridged from a manuscript now in the possession of the Massachusetts Historical Society, in Dr. Warren's handwriting. It has been edited but slightly. It was written at about the time of the opening of the Harvard Medical School, one hundred and fifty years ago, and hitherto appears to have escaped publication. It is not only of historic interest to the *Journal* and Harvard Medical Alumni but also contains certain ideas still practical on problems concerned with medical education and licensure.

*Warren, John: Remarks on angina pectoris. New Eng. J. Med. & Surg. 1:1 (Jan.) 1812.

SESQUICENTENNIAL OF THE HARVARD MEDICAL SCHOOL

ON Friday and Saturday of this week, October 6 and 7, it is planned to commemorate the one hundred and fiftieth anniversary of the establishment of the Harvard Medical School, an event of considerable importance in the history of medical education in America. The exercises on Friday, under the auspices of the Harvard Medical Alumni Association, will take the form of a programme at the Medical School and at three of its affiliated hospitals in Boston. The aim of this programme is to demonstrate to interested alumni a part of the various facilities for clinical training now available to Harvard students, and to call attention to certain of the investigations in the field of medicine recently

completed by members of the Faculty. In the morning there will be medical ward rounds and surgical operations by the staffs of the Massachusetts General Hospital, the Boston City Hospital, and the Peter Bent Brigham Hospital. At each of these hospitals a complimentary luncheon will be served for the visiting alumni. In the afternoon, in the Amphitheatre of Building C of the Harvard Medical School, a series of five topics will be presented by members of the Faculty. In the evening there will be an anniversary dinner for the alumni in Vanderbilt Hall.

The observance on Saturday, October 7, will consist of a programme at Sanders Theatre in Cambridge, arranged by the President of the University and by the Dean and Faculty of the Medical School. The aim of this programme is to repeat in part the exercises held at the College on this day one hundred and fifty years ago. These exercises, as preserved for us in the Corporation Records of October 7, 1783, were concerned primarily with the public induction into office of Dr. John Warren as Professor of Anatomy and Surgery, and of Dr. Benjamin Waterhouse as Professor of the Theory and Practice of Physic. On this occasion the inaugural orations of these two professors were delivered by them in Latin. At the repetition of these exercises in 1933, after an introductory address by President Conant, these identical orations will again be delivered in English, for Dr. Warren by the present Herseian Professor of Anatomy, and for Dr. Waterhouse by the present Herseian Professor of the Theory and Practice of Physic. There will also be an address by President Lowell. The same Tate and Brady hymns will be sung as in 1783. After the exercises there will be a luncheon at the Faculty Club.

Those who are familiar with Dr. Harrington's admirable history of the Harvard Medical School, require no recapitulation of its details or emphasis of its importance in medical education. Interest in the observance of October 7 centers largely in the happy thought of reproducing in part the exercises of one hundred and fifty years ago. The orations of Dr. Warren and of Dr. Waterhouse should be impressive and inspiring even in English translation. Everyone will be glad of the opportunity to see and hear the new President, Dr. Conant, and his beloved predecessor Dr. Lowell. It is earnestly to be hoped that the occasion will be largely attended by the alumni.

Medical graduates and undergradates who wish to be present should assemble by classes in the Yard at 10:15 A.M. in front of Harvard Hall, whence they will escort the President, Corporation, Faculty, Overseers, and other guests to Sanders Theatre. Faculty members should wear academic costume.

HOSPITAL PROGRAMS

Massachusetts General Hospital

Clinical Meeting to be held in conjunction with the Harvard Medical School 150 Anniversary
Ether Dome — October 6
10:00 A.M. to 12:30 P.M.

PROGRAM

10:00-10:15	Some Aspects of Myxedema. J. H. Means and J. Lerman.
10:15-10:25	Studies on Paget's Disease of the Bones. F. Albright.
10:25-10:35	Nutritional Edema. C. M. Jones.
10:35-10:45	Encephalography in Diseases of the Nervous System. H. C. Solomon.
10:45-10:55	Neuro-Surgical Procedures for the Relief of Intractable Pain. W. J. Mixter and T. J. Putnam.
10:55-11:05	Metaplastic and Neoplastic Extra-Skeletal Bone Tumors. T. B. Mallory.
11:05-11:15	On the Diameter of the Aorta. A. O. Hampton.
11:15-11:30	Fractured Hips. M. N. Smith-Petersen.
11:30-11:45	Clinical and Experimental Aspects of Vaso-Spasm. A. W. Allen and Associates.
11:45-12:00	Teaching of Surgery to Undergraduates at the Massachusetts General Hospital. E. D. Churchill.
12:00-12:10	Harvard Medical School and Massachusetts General Hospital. F. A. Washburn.
12:10-12:20	The film entitled: "The Advent of Anesthesia." (Two reels.)
12:30	Luncheon.

The Treadwell Library will exhibit some Warreniana.

Peter Bent Brigham Hospital

October 6, 1933

MEDICINE

10:00-11:45	Ward Rounds, E Main, Dr. Christian; F Main, Dr. Emery; E2, Drs. Aub and Derick.

SURGERY

10:00-11:45	Ward Rounds and operations, 10-12, Operating Rooms and Surgical Wards, Drs. Cutler, Cheever, Homans, Quinby, Newton and Zollinger.

AMPHITHEATER

11:45-12:05	Dr. Christian, The Teaching of Medicine at the Peter Bent Brigham Hospital.
12:05-12:30	Dr. Cutler, The Teaching of Surgery at the Peter Bent Brigham Hospital.
12:30	Luncheon.

BOSTON CITY HOSPITAL

MEDICINE

Ward Walks 10:30 A.M. to 12:30 P.M.; II Medical Service, Dr. Weiss and Dr. Ellis; IV Medical Service, Dr. Keefer and Dr. Hamilton.

Thorndike Memorial Laboratory and Clinic open for inspection and discussions with members of the Staff from 10 A.M. to 12:30 P.M.

NEUROLOGY AND NEUROSURGERY

Ward Walks from 10:30 A.M. to 12:30 P.M.; Dr. Stanley Cobb and Dr. Donald Munro.

Inspection of the laboratories and discussions with members of the Staff from 10 A.M. to 12:30 P.M.

SURGERY

Surgical demonstration in the Operating Room from 10 A.M. to 11:30 A.M.; Dr. Irving J. Walker.

Ward Walks 10:30 A.M. to 12:30 P.M.; Fifth Surgical Service, Dr. Walker and his associates.

LUNCHEON

Luncheon will be served in the House Officers' Dining Room from 12:30 to 1:30.

MISCELLANY

A REORGANIZATION OF THE DEPARTMENT OF NEUROSURGERY AT THE MASSACHUSETTS GENERAL HOSPITAL

The Massachusetts General Hospital announces a reorganization of the clinical work in Neurosurgery under the direction of Dr. W. J. Mixter. Additional beds have been assigned for the use of patients with neurosurgical diseases and a special operating room set aside for these cases.

Dr. Tracy J. Putnam, Assistant Professor of Neurosurgery at the Harvard Medical School, has been appointed a member of the Surgical Staff to work with Drs. Mixter and Hodgson in the Neurosurgical Assignment. Dr. Putnam leaves a position in the Neurological Unit at the Boston City Hospital to accept the post at the Massachusetts General Hospital. An experimental laboratory for the study of neurosurgical problems will be developed under his supervision.

SUFFOLK DISTRICT MEDICAL SOCIETY

RESULT OF QUESTIONNAIRE

The Committee on Supervision of the Suffolk District Medical Society has recently made an attempt to ascertain whether any change from the general type of program, that has been offered in previous years, would appeal to the Society as a whole. Early in the summer the following questionnaire was sent to each of the 803 members:

The type of meeting which appeals to me most is one that:

(1) Has one or two papers on general clinical subjects
(2) Includes presentation of actual cases
(3) Gives short papers on special topics, for example:

.....

.....

(4) Brief résumés of research which are applicable to clinical practice
(5) Is held at: A. One of the hospitals
B. The Boston Medical Library
C. .....

Signed .....
Address .....

At the time of going to press 223 replies had been received. As may be seen from the tabulation of the results below, there was no great preponderance of opinion in favor of any of the four types of papers suggested, and, although there were more votes in favor of holding the meetings at the Boston Medical Library than at one of the hospitals, the majority was not great enough to be considered significant. Despite the fact that the questionnaire showed no decisive preferences, a careful analysis of the replies has revealed some interesting data as shown by the following table:

The type of meeting which appeals to me most is one that:	
(1) Has one or two papers on general clinical subjects	113
(2) Includes presentation of actual cases	87
(3) Gives short papers on special topics	78
(4) Brief résumés of research which are applicable to clinical practice	72
(5) Is held:	
A. At one of the hospitals	107
B. At the Boston Medical Library	129

Expressing preference for only one of above four types of programs	84	
Expressing no preference	7	
Expressing preference for two of above four types	80	
Expressing preference for three of above four types	27	
Expressing preference for all four of above	25	
		132
Total Replies		223
Total Membership		803

It will be noted that over half (132) expressed a desire for a varied program by voting for more than one of the types of papers suggested, and of this number 27 voted for three and 25 for all four types. Of the 78 who wished short papers on spe-

cial topics 53 indicated specific subjects that would appeal to them, but, since no more than three coincided on any one subject, the Committee has not been assisted in its task of selection.

In addition to the answers requested, however, nearly half of those replying to the questionnaire gave constructive criticisms and suggestions which will be of great value to the Committee. These comments are too varied for complete enumeration but the following seem indicative of the wishes of the Society:

1. The program should consist largely of recent advances in diagnosis and treatment.
2. Papers should have a practical bearing that will benefit the general practitioner.
3. There should be more opportunity for informal discussion.
4. The speakers should be men who are preëminent in their fields and whenever possible men from other sections of the country.

CONCLUSIONS

From this questionnaire it would seem that the Society as a whole wishes:

1. A varied program.
2. Ample opportunity for discussion.
3. Papers bearing largely on the problems of the general practitioner.
4. Speakers of national reputation.

Obviously the latter are not easily obtainable for such small meetings as those of the Suffolk District Medical Society, but the Committee will do its utmost to carry out the wishes of the Society, and it desires to express its thanks to the members who have answered the questionnaire.

IMPORTANT MEETING

The first meeting of the Suffolk District Medical Society will be held on Wednesday, October 25, 1933, at the Boston Medical Library at 8:15 P.M. As a result of the questionnaire the Committee has made an especial effort and been fortunate enough to secure Dr. Oliver Hazard Perry Pepper of Philadelphia as the principal speaker. Dr. Pepper will speak on "Cerebral Hemorrhage and Thrombosis: The Importance of the Differential Diagnosis to Treatment and the Importance of Prevention."

Dr. Jacob H. Swartz of Boston will also address the Society. His subject will be "Fungus Infections of the Skin."

The Committee hopes that all members will attend this important meeting.

Be sure to reserve the date, Wednesday, October 25. Place: Boston Medical Library. Time: 8:15 P.M.

THE ADVERTISING OF KRUSCHEN SALTS

The Boston Better Business Bureau has called attention to the order of the Federal Trade Commission to the concern of E. Griffith Hughegs, Inc., to stop representing that its "Kruschen Salts" constitutes a cure or remedy for obesity or that it will of itself reduce excess fat.

Five physicians and one pharmacologist testified on behalf of the Commission to the general effect that a preparation of the constituents as listed above, and taken in the dosage recommended, does not constitute a treatment for obesity and will not in itself reduce excess fat.

Five other physicians testified on behalf of the company to the effect that they gave Kruschen Salts to various patients, who after a time, showed losses in weight. However, the Commission found that these tests were not scientifically conducted and "were not of such a character as to warrant the conclusion or to be the basis of an opinion that the taking of Kruschen Salts effected any reduction in weight that might have ensued in such cases". The Commission also stated in its findings that "such tests were not so conducted as to eliminate from consideration intervening causes or factors which bring about loss of fat or loss of body weight."

MORTALITY STATISTICS IN THE DEATH REGISTRATION AREA OF CONTINENTAL UNITED STATES: 1930, 1931 AND 1932

Washington, D. C., September 28, 1933 — The Bureau of Census announces that in 1932 in the death registration area of continental United States (exclusive of the State of Utah) there were 1,304,109 deaths from all causes, representing a mortality rate of 10.9 per 1,000 estimated population. This is the lowest rate since the annual collection of mortality statistics was begun in 1900. It is estimated that 96.3 per cent of the total population of the United States was included in the registration area for the year 1932. Because of the failure of the State of Utah to furnish the Bureau with death certificates for the year 1932, no data for that State are included in the summary. However, even if the number of deaths which occurred in Utah were included, the total deathrate for each of the three years would remain practically unchanged.

The table accompanying this announcement (but which space does not permit of reproduction) gives the number of deaths and the deathrates in each year from 1930 to 1932, inclusive, for each cause, according to the titles of the International List of Causes of Death. This is the first time that the Bureau has released a summary in such detail prior to the publication of the annual report.

It is gratifying to note that of the 18 groups of causes of death into which this table is divided, 13 showed decreases in the total number of deaths, while only three groups had increases, and two remained practically the same. The groups which show decreases include infectious and parasitic diseases, chronic poisonings and intoxications, diseases of the nervous system, of the respiratory system, of the digestive system, and of

pregnancy, childbirth and the puerperal state. Of particular interest is the decrease in certain causes of death such as typhoid fever, measles, diphtheria, tuberculosis, malaria, diarrhea and enteritis under two years of age, and some others. The large decrease of over 9,000 deaths from tuberculosis (all forms), and the drop in the death-rate from 71.7 in 1930 to 63.0 in 1932 is most noteworthy. The smaller number of deaths from diseases of the respiratory system may be accounted for largely by the decrease in both bronchopneumonia and lobar pneumonia. Influenza showed a decided increase, though the rate of increase for 1932 over 1931 was much less than from 1930 to 1931. The decrease in diseases of pregnancy, childbirth, and the puerperal state was approximately the same from 1931 to 1932, as from 1930 to 1931, and is due in a large measure to the lesser number of deaths from puerperal albuminuria and eclampsia, and puerperal septicemia.

The smaller number of violent and accidental deaths is due, principally, to the decreased number of deaths from motor vehicles, as shown in the supplemental table. The number of suicides increased for the three-year period, and the number of homicides was more for 1932 than for 1930, though less than in the year 1931.

The outstanding groups in which large increases were shown were cancers and other malignant tumors and diseases of the circulatory system. The number of deaths due to cancer and other malignant tumors continues to increase from year to year, and practically every title to which deaths due to this cause are allocated shows an increase in number, if not in actual rates. Of the total number of deaths assigned to this title, 25,802 were of the stomach and duodenum, 14,871 of the uterus, 11,863 of the breast, and 10,420 of the liver and biliary passages.

Deaths due to diseases of the circulatory system increased numerically from 280,403 in 1930 to 294,596 in 1932, equivalent to deathrates of 237.5 and 246.2, respectively. This large increase was due, principally, to diseases of the myocardium and of the coronary arteries, angina pectoris; chronic endocarditis, valvular diseases being the only cause in this group for which there was a considerable decrease in 1932 from 1930.

CHANGES IN THE OFFICIAL BODY OF THE NATIONAL SOCIETY FOR THE PREVENTION OF BLINDNESS, INC.

The promotion of Miss Eleanor P. Brown, secretary of the National Society for the Prevention of Blindness, to the rank of an associate director, is announced by Lewis H. Carris, managing director of the Society. Miss Regina E. Schneider, formerly secretary to Mr. Carris, becomes secretary of the organization.

Miss Brown, in addition to other work, will have administrative charge of the training, placement and supervision of medical social workers for service in eye clinics and hospitals. Mrs. Winifred Hathaway, who has been an associate director for some years, is director of the educational activities.

MORTALITY RATES

Telegraphic returns from 85 cities with a total population of thirty-seven million for the week ending September 16, indicate a mortality rate of 9.5 as against a rate of 9.3 for the corresponding week of last year. The highest rate (15.8) appears for St. Louis, Mo., and the lowest (3.5) for Flint, Mich., and Lynn, Mass. The highest infant mortality rate (12.2) appears for Oklahoma City, Okla., and the lowest for Bridgeport, Conn., Duluth, Minn., Evansville, Ind., Ft. Wayne, Ind., Kansas City, Kans., Knoxville, Tenn., Lowell, Mass., Lynn, Mass., New Bedford, Mass., Peoria, Ill., Schenectady, N. Y., Somerville, Mass., and Yonkers, N. Y., which reported no infant mortality.

The annual rate for 85 cities is 10.9 for the thirty-seven weeks of 1933, as against a rate of 11.2 for the corresponding period of the previous year.

SUMMARY OF DEATHS AND DEATH RATES (ANNUAL BASIS) FROM AUTOMOBILE ACCIDENTS PER 100,000 ESTIMATED POPULATION FOR 86 CITIES FOR CORRESPONDING PERIODS OF 1933 AND 1932

	Week ending		First 37 weeks	
	Sept. 16, 1933	Sept. 17, 1932	1933	1932
Total deaths	184	149	5,319	5,307
Death rate	25.6	21.2	20.0	20.4
Deaths due to accidents in city	150	116	4,193	4,279
Death rate	20.9	16.5	15.8	16.4

—Bureau of the Census.

A HOSPITAL FOR ARMY AND NAVY MEN

A government hospital costing $1,500,000 has been built at Hot Springs, Arkansas. It is the tallest building in that state. Accommodations are arranged for 412 beds, but may be extended to care for more than 600 patients.

Quarters will be provided for twenty sets of married officers, a number of bachelor quarters, six non-commissioned officers, a recreation building, a guard house, quartermaster building, a utility building, an incinerator, and additional barracks.

This hospital is to have the most approved and complete equipment which may be needed in dealing with these men.

The formal opening will take place at an early date.

CORRESPONDENCE

LEAD IN BOSTON'S WATER

City of Boston
Health Department
City Hall Annex
September 27, 1933.

Editor, *New England Journal of Medicine,*

In considering the matter of lead in Boston's drinking water, it is most important that the practicing physicians, comprising a large proportion of the *Journal's* readers, should not permit their attention to be diverted from the following mentioned facts:

A patient, a child, in a Boston hospital showed an abnormal bone condition which was diagnosed as chronic lead poisoning. An investigation by the State Department of Public Health at the patient's home showed lead pipe house connections with the water main and an amount of lead in the family drinking water "that has been known to cause lead poisoning," according to the State Department of Public Health. An investigation by the Boston Health Department confirmed the existence of the lead pipe, the amount of lead in the drinking water in this household, and also according to the results of studies of the U. S. Public Health Service the statement that the water contained a possibly dangerous amount of lead appeared to be justifiable.

We learned that although the City no longer makes water main connections with lead pipe, over ninety per cent of the houses in Boston still have old lead pipe water main connections. Examinations of the water supply, both "high" and "low" pressure, in different parts of the city showed approximately the same amount of lead as in the child's home. An investigation of the hospital where the child was a patient showed no lead pipe water connections. Examinations of the water at this hospital and at other places where there are no lead pipe connections show merely the trace of lead to be expected in any reservoir water.

If this child acquired chronic lead poisoning from the drinking water in his home, as is to be inferred from the State Health Department's investigation and also from its recommendations, then about ninety per cent of the people of Boston are exposed to the same danger. This is the reason why it was deemed advisable to suggest to the Editor of the *Journal* that the matter be brought to the attention of practicing physicians.

The foregoing facts and their practical importance to physicians and patients are not to be lost sight of in any discussion of the causes of the amount of lead to be found at present in Boston's drinking water or the remedy. These are entirely different propositions. Allowing the water to run before using is not likely to assure the user of safety, because, as is to be inferred from theoretical reasons and as we have demonstrated experimentally, it is necessary to run through the lead pipe an amount of water equal to about one hundred times its internal capacity before the lead in the effluent is reduced to a possibly negligible quantity. Dr. Bigelow really suggests no remedy, but intimates that the present amount of lead found in the drinking water in Boston households cannot be due to the chlorination of the Boston water supply and must be due to other causes, because they find no "free chlorine" at household taps.

We have found "free chlorine" in some of our own samples. On several examinations we have found free chlorine at our Health Department Laboratory tap. (High pressure service.) A State official's claim that the reaction indicative of the presence of free chlorine was due to the presence of "interfering substances" was easily shown in his presence to be untenable.

We cannot accept the absence of free chlorine at household taps as proof that the chlorination of Boston's water supply is not affecting its solvent action on lead in lead water pipe connections. We do not, however, at present presume to say whether the objectionable amount of lead in Boston's drinking water is due to chlorination, or to "other causes," as Dr. Bigelow suggests. The City of Boston is not dependent upon State officials to determine the presence of free chlorine, or the amount of lead in our water at present, nor for reliable records of the amount of lead which Boston water has shown in the past. We are not now finding lead in appreciable amounts in houses without lead pipe water main connections, nor did we find lead in noteworthy amounts in houses with old lead pipe water main connections in the past. Whatever may be the cause or proper remedy we know that lead has appeared to an objectionable amount in the drinking water of the people of Boston since the chlorination of Boston's water supply began.

Yours truly,

M. Victor Safford,
Acting Health Commissioner,
City of Boston.

RECENT DEATHS

FRECHETTE — Clement Frechette, M.D., of Leominster, Massachusetts, died in that city September 27, 1933. He was born in Montreal in 1869 and graduated from the Victoria College in that city.

He was a member of several Franco-American organizations and a trustee of the Leominster public library. He leaves a widow and three children, Irene and Hortense Frechette of Leominster, and Mrs. Clara Hull of Newtonville.

WETHERBEE—Roswell Wetherbee, M.D., of 10 Trapelo Road, Belmont, died July 1, 1933. He was graduated from the Medical School of Harvard

University in 1882 and joined the Massachusetts Medical Society in the same year. He retired in 1923.

REPORTS AND NOTICES OF MEETINGS

THE AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

The Thirty-Eighth Annual Meeting of the American Academy of Ophthalmology and Otolaryngology was held at the Hotel Statler, Boston, September 16-22, inclusive. The Surgeon-General, Robert U. Patterson, was the guest of honor.

This Society has a membership of about twenty-two hundred members in the United States and Canada.

This Society, under the Presidency of Dr. Burt R. Shurly of Detroit, Michigan, together with that of other major medical societies, feeling that it was under obligation to the public in counteracting misstatements of medical facts through advertising and radio, decided that a dignified presentation of subjects involving Ophthalmology and Otolaryngology, should be presented. A Public Meeting was held on Sunday, September 17. The following discussions were presented.

Cultural, Spiritual and Material Medicine. Dr. Edward H. Cary, Dallas, Texas.

Concerning Eyestrain. Dr. Edward Jackson, Denver, Colo.

Facts and Fallacies about the Home Use of Eye Remedies. Dr. W. L. Benedict, Rochester, Minn.

Colds—What They Can do to Our Ears and Our Brain. Dr. Wells P. Eagleton, Newark, N. J.

In addition to numerous scientific addresses embracing the aforementioned specialties, there was an intensive course of instruction, given by the leading teachers in their respective subjects.

The Society maintains numerous research fellowships in the scientific investigation of the problems of ophthalmologists and otologists. Their committee on the hard of hearing is carrying out an intensive national campaign to educate the general public as to the importance of the prevention of deafness, and is attempting to bring the otologist and the commercial houses, dealing with the artificial aids of hearing, into closer coöperation.

BRISTOL COUNTY ORTHOPAEDIC CLUB

There was a "Dinner and Speaker" meeting of the Bristol County Orthopaedic Club at the Quequechan Club, 306 North Main Street, Fall River, Mass., Tuesday, September 26, 1933, at 6:30 P.M.

Dr. Arthur P. Legg, of the Harvard Infantile Commission, gave a talk on "New Developments on the Etiology and Treatment of Acute Poliomyelitis."

EARLE E. HUSSEY, *Secretary.*

NEW ENGLAND DERMATOLOGICAL SOCIETY

The next meeting of the New England Dermatological Society will be held on Wednesday, October 11, 3 P.M., at the Massachusetts General Hospital.

J. HARPER BLAISDELL, *Secretary.*

WILLIAM HARVEY SOCIETY

The opening meeting of the William Harvey Society, of the Tufts College Medical School, will be held at 8 o'clock P.M. on October 13 in the auditorium of the Beth Israel Hospital, Boston.

The speaker will be Dr. William Gerry Morgan, formerly President of the American Medical Association. His subject is "Shakespeare's Knowledge of Medicine." The Chairman of the meeting will be Dr. A. Warren Stearns, Dean of Tufts College Medical School.

Members of the medical profession are cordially invited to attend the meeting.

THE SOCIETY OF PLASTIC AND RECONSTRUCTIVE SURGERY

This organization will hold its annual meeting in New York City, October 16, 17, and 18, 1933, at the New York Academy of Medicine with sessions also at the New York Hospital and Cornell University Medical College; Institute of Ophthalmology, Columbia Medical Center; New York Post Graduate School and Hospital; Sydenham Hospital; and Manhattan Eye, Ear and Throat Hospital.

The objects of this Society are (a) to promote and further medical and surgical research pertaining to the study and treatment of congenital and acquired deformities; (b) to keep the medical profession informed as to the scientific progress and the possibilities of plastic and reconstructive surgery; and (c) to stress the great social, economical and psychological importance of this surgical specialty.

A very interesting program has been arranged with dry clinics, hospital exercises and social functions.

The profession is invited to attend.

The Secretary is Dr. Arthur Palmer, 667 Madison Avenue, New York City.

SOUTH END MEDICAL CLUB

The next regular meeting of the South End Medical Club will be held on Tuesday, October 17, 1933, at 12 noon, at the headquarters of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston. The speaker will be William Reid Morrison, M.D., Visiting Surgeon, Boston City Hospital, and Associate Professor of Surgery, Boston University School of Medicine. His subject will be "Stomach Surgery" and will be illustrated by Motion Pictures. The usual luncheon will be served at 1 o'clock. All physicians are cordially invited to attend.

SUFFOLK DISTRICT MEDICAL SOCIETY

IMPORTANT MEETING

For details of the meeting of October 25 see page 709.

WATERTOWN PHYSICIANS' SOCIETY

The Watertown Physicians' Society will hold its monthly meeting Tuesday evening, October 10, 1933, at 8:30 P.M. at 128 Mt. Auburn Street, Watertown. All physicians are cordially invited to attend.

E. F. GORMAN, M.D., *Secretary.*

SOCIETY MEETINGS, CONGRESSES AND CONFERENCES

October 5—Clinic at the Peter Bent Brigham Hospital, at 3:30 P.M., conducted by Dr. Henry A. Christian.

October 6 and 7—The One Hundred and Fiftieth Anniversary of the Harvard Medical School. See page 707.

October 9-12—The American Public Health Association will hold its sixty-second annual meeting at Indianapolis. For details on the scientific program write to the American Public Health Association, 450 Seventh Avenue, New York, N. Y.

October 9-13—The Clinical Congress of the American College of Surgeons will hold its twenty-third annual session at Chicago. Headquarters for the Congress will be at the Stevens Hotel.

October 10—Watertown Physicians' Society. See notice above.

October 11—The New England Dermatological Society. See page 713.

October 13—William Harvey Society. See page 713.

October 16, 17, and 18—The Society of Plastic and Reconstructive Surgery. See page 713.

October 16, 17, 18—Massachusetts State Nurses' Association, Hotel Kimball, Springfield, Mass. For details write Helene G. Lee, R.N., 420 Boylston Street, Boston.

October 16—Ether Day will be celebrated at the Massachusetts General Hospital on Monday afternoon at 4:00 o'clock in the Moseley Memorial Building.

October 16-20—The International Assembly of the Inter-State Postgraduate Medical Association of North America will be held in the Public Auditorium, Cleveland, Ohio.

October 17—South End Medical Club. See page 713.

October 18—New England Physical Therapy Society. First Fall Meeting. Detailed announcement later. Dr. Arthur H. Ring, Secretary, 163 Hillside Avenue, Arlington, Mass.

October 23 - November 3—The 1933 Graduate Fortnight of the New York Academy of Medicine. The theme during the two weeks of intensive study will be Metabolic Disorders. A complete program may be obtained by writing Dr. Frederick P. Reynolds, The New York Academy of Medicine, 2 East 103rd Street, New York City.

October 25-30—International Congress on the Scientific and Social Contest Against Cancer will be held at Madrid. For information address Dr. Julio Bejarano, Atocha, 104. Madrid, Spain.

October 28—The American Board of Dermatology and Syphilology will hold written examinations for candidates in the following cities: New York City; St. Louis, Mo.; Boston, Mass.; Cleveland, Ohio; San Francisco, Calif.; Philadelphia, Pa.; Chicago, Ill. Information may be obtained from the Secretary, Dr. C. Guy Lane, 416 Marlborough Street, Boston, Mass.

December 15 and 16—The American Board of Dermatology and Syphilology will hold oral examinations in New York City. Information may be obtained from the Secretary, Dr. C. Guy Lane, 416 Marlborough Street, Boston, Mass.

April 16-20, 1934—The American College of Physicians will hold its Eighteenth Annual Clinical Session in Chicago at the Palmer House. For information write Mr. E. R. Loveland, Executive Secretary, 133-135 South 36th Street, Philadelphia, Pa.

July 24-31, 1934—The IVth International Congress of Radiology will be held in Zurich under the presidency of Professor H. R. Schniz. General Secretary Dr. H. E. Walther, Gloriastrasse 14, Zurich.

September 4, 5, 6, 1934—International Union Against Tuberculosis will be held in Warsaw. For particulars address The National Tuberculosis Association, 450 Seventh Avenue, New York, N. Y.

DISTRICT MEDICAL SOCIETIES

ESSEX NORTH DISTRICT MEDICAL SOCIETY

October 18—The next meeting of the Essex North District Medical Society will be at Andover Academy (Phillips Inn) on Wednesday, October 18, at 1 P.M.

Speakers:
Dr. W. H. Robey, President of the Massachusetts Medical Society.
Dr. Arthur W. Allen, "Pitfalls in Surgical Diagnosis."
Dr. B. H. Ragle, "Pitfalls of Medical Diagnosis."

E. S. BAGNALL, Secretary.

FRANKLIN DISTRICT MEDICAL SOCIETY

Meetings will be held on the second Tuesday of November, January, March and May at the Weldon Hotel, Greenfield, at 11 A.M.

CHARLES MOLINE, Secretary.

MIDDLESEX EAST DISTRICT MEDICAL SOCIETY

Schedule 1933-1934

Meetings will take place on November 8 at the Bear Hill Club, Stoneham; January 10 at Melrose; March (2nd Wednesday) at Wakefield, and May (2nd Wednesday) at Winchester.

ALLAN R. CUNNINGHAM, Secretary.
76 Church Street, Winchester, Mass.

MIDDLESEX NORTH DISTRICT MEDICAL SOCIETY

Meetings will be held on October 25, January 31, and April 25 (Annual Meeting).

T. A. STAMAS, Secretary.

NORFOLK DISTRICT MEDICAL SOCIETY

October 31—Stated Meeting, Hotel Kenmore, 8 P.M. Dr. H. J. Inglis.

November 28—Roxbury Masonic Temple, 8 P.M. Pneumonia Symposium, in charge of Dr. Frederick T. Lord.

January 28—Tentatively Roxbury Masonic Temple, 8 P.M. Continuance of Symposium on Diseases of the Blood. Dr. Dameshek and Dr. Straus.

February 27—Place, time, subject, and speaker to be announced.

March 27—Place and time to be announced. Dr. Edward A. Edwards and Dr. Henry H. Faxon. Symposium on the Treatment of Varicose Veins.

May—Annual Meeting. Place, time and program to be announced.

FRANK S. CRUICKSHANK, M.D., Secretary.

NORFOLK SOUTH DISTRICT MEDICAL SOCIETY

October 5—12 noon at Norfolk County Hospital. Speaker: Dr. L. P. Crawford. Subject: Acute Intestinal Intoxication.

November 2—12 noon at Norfolk County Hospital. Stated Meeting. Speaker: Dr. Timothy Leary. Subject: Comparative Experimental Arteriosclerosis with Human Coronary Sclerosis.

December 7—12 noon at Quincy City Hospital. Program by the hospital staff.

January 4—12 noon at Norfolk County Hospital. Speaker to be announced.

February 1—12 noon at Norfolk County Hospital. Stated Meeting. Speaker: Dr. Sara Jordan. Subject: Stomach Ulcers.

March 1—12 noon at Quincy City Hospital. Program by the hospital staff.

April 5—12 noon at Norfolk County Hospital. Speaker: Dr. Elliott P. Joslin. Subject: Diabetes.

May 3—12 noon at Norfolk County Hospital. Annual Meeting. Election of Officers.

SUFFOLK DISTRICT MEDICAL SOCIETY

October 25—See page 709.
November 29—To be announced.
January 31—With Boston Medical Library and the Trudeau Society. Lawrason Brown, Principal speaker.
March 28—To be announced.
April 25—Annual Meeting.

WORCESTER DISTRICT MEDICAL SOCIETY

All meetings to be held on Wednesdays as follows:

October 11—Dinner and scientific program at the Rutland State Sanatorium, Rutland, Mass.

November 8—Dinner and scientific program at the Grafton State Hospital, North Grafton, Mass.

December 13—Dinner and scientific program at St. Vincent Hospital, Worcester, Mass.

January 10—Dinner and scientific program at the Worcester City Hospital, Worcester, Mass.

February 14—Dinner and scientific program at the Worcester State Hospital, Worcester, Mass.

March 14—Dinner and scientific program at the Memorial Hospital, Worcester, Mass.

April 11—Open date.

May 9—Annual Meeting. Time and place to be announced later.

ERWIN C. MILLER, M.D., Secretary.